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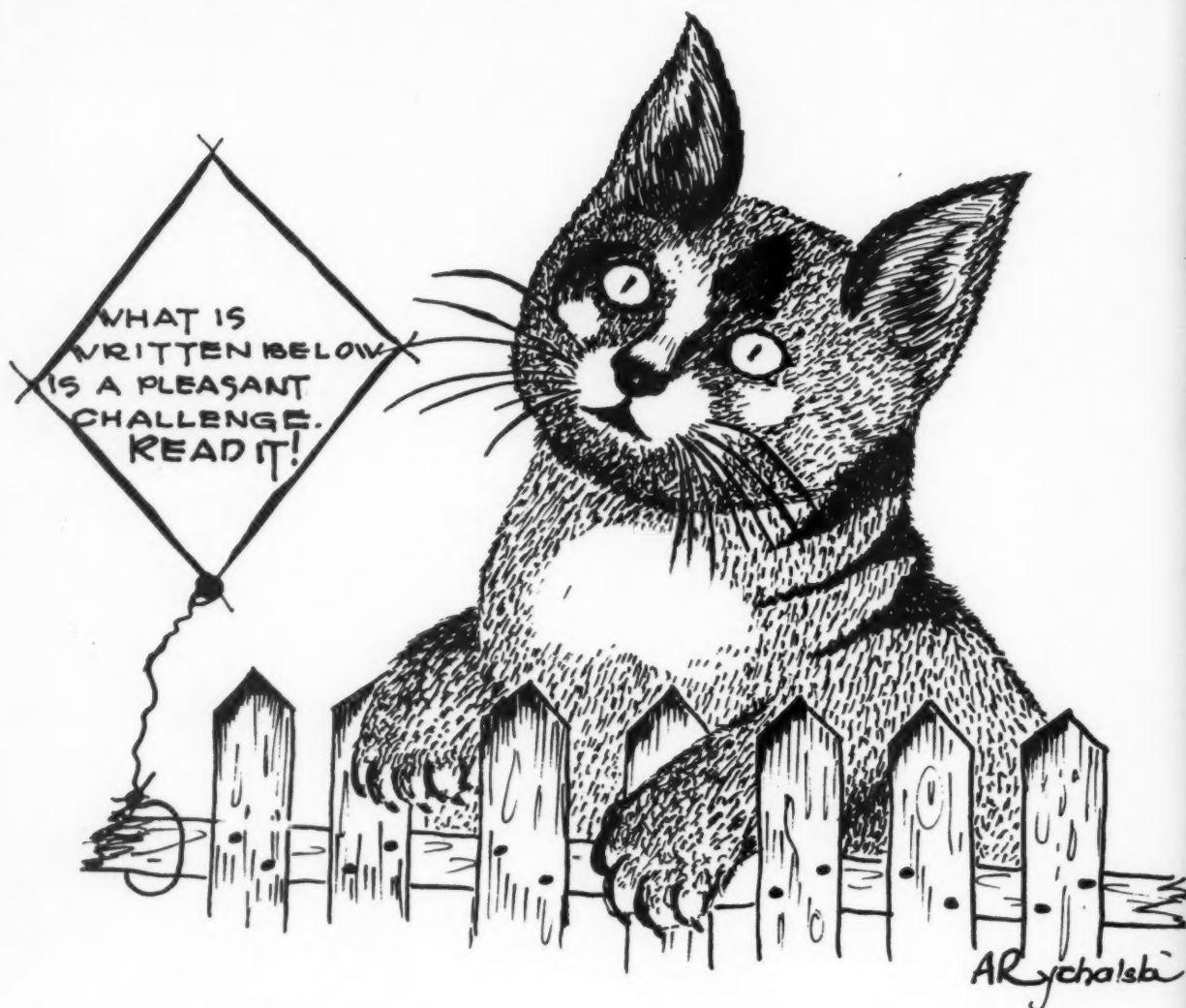


ENGINEERING EDUCATION FOR THE FUTURE - PAGE FIVE

VOL. 13

JANUARY, 1960

No. 6



DEAR WSE MEMBERS:

We are letting the cat out of the bag. Yes, we are admitting that without your help, the Membership Committee is a toothless old tiger. But if you help us to attain our goal set in the following "equation" we will be back on our feet. The equation: Over the top of a fence is placed a rope, the same amount on both sides. The rope weighs one-third lb. per foot. On one end of the rope hangs a cat holding a mouse and on the other end is a weight equal in weight to the weight of the cat. The mouse weighs 2 oz. per inch. The length of the rope (in feet) is equal to the age of the cat and the cat (in inches) is as much as the age of the cat's mother. The combined ages of the cat and its mother are 30 years. The weight of the cat plus one-half the weight of the cat is one-quarter as much as the sum of the weights of the weight and the rope, where all weights are in the same units. The cat's mother is one-half as old as the cat will be when it is three times as old as its mother was when she was one-half as old as the cat will be when it is twice as old as it is now. It would be good for the society if we could increase the membership by the length of the mouse times twice the combined ages of the cat and its mother. The answer to this "equation" is our goal—345 new members. You should have a lot of fun solving the equation.

THE MEMBERSHIP COMMITTEE

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COVER STORY

Climaxing the Western Society's big 90th Anniversary Year was the gay celebration held at the Society on December 17. An important feature of that event was the presentation of the Society's Citation Award to Mr. H. I. Romnes. Romnes is a former member of the Western Society, and president of Western Electric Company, an organization also celebrating its 90th year. Our cover shows Mr. Romnes as he delivered his subsequent address on "Individualism in Engineering."

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John W. Evers, former president of Commonwealth Edison Company, accepts Citation Award Certificate from Philip L. Coleman, chairman of WSE's Development Committee. Mr. Coleman, WSE V.P., is a partner in the firm of Duff & Phelps.

Above, right, Evers, WSE program chairman H. R. Heckendorn, and speaker Morgan Murphy, Commonwealth Edison V.P., converse.

At right, Coleman and C. G. Schelly, DoALL Company's director of Educational Research, relax. DoALL's display filled three walls.

After the presentation on "The Cutting Edge" was completed, members of the audience took a closer look at displays. Tools ranged from primitive to modern.



The picture below again shows some of those at the speakers table. From left to right are E. Rogers, E. B. Rietz, J. W. Evers, Morgan Murphy, P. L. Coleman.



Above, Edgar Rogers, senior staff engineer with Commonwealth Edison, and Earl B. Rietz, assistant to the vice president of engineering, I-T-E Circuit Breaker Company, observe a photographer. Rietz spoke on "Power Circuit Breakers." Rogers served as Section vice chairman. Below, Rietz launches into his talk.



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CITATION AWARD

COFFEE TALK

2 TECHNICAL SESSIONS

THE CUTTING EDGE

POWER CIRCUIT BREAKERS

IT HAPPENED

ON THE 24th

A BIG NOVEMBER MEETING

Dining room utensils seemed unusually keen at WSE Headquarters on November 24. In fact, almost any direction you looked in the Dining Room you saw a multiplicity of cutlery, meaning "cutting edges." Many of the cutting edges were capable of whizzing through any steak, or, for that matter, right through a piece of steel.

"The Cutting Edge," presented by Mr. C. G. Schelly of the DoALL Company, was the subject of one of the evening's technical sessions. The display for it was so elaborate that it could be erected only in the Society Dining Room.

Evers Honored

As dessert was served, John W. Evers, just retired as president of Commonwealth Edison Company, was presented with the Western Society's Citation Award. Mr. Evers merited the Award because of his "outstanding contributions as an industrial and civic leader in Chicago." Philip L. Coleman is chairman of the Society's Development Committee, responsible for the Award.

Little Bill's father, as coffee talker, next stood up. Little Bill, you will remember, is a popular Chicago publication and television personality. A sort of trademark of Commonwealth Edison Company, he is attributed to be the brain child of Morgan Murphy, public relations vice president of that company.

Potpourri

Mr. Murphy's subject was "Potpourri," and he quickly made an admission:

"When I accepted the assignment, Mr. Heckendorn, chairman of the Western Society's Program Committee, began dunning me for a title, and so I picked the one that was in your bulletin. I didn't learn how to pronounce it until

today. On looking it up in Webster's dictionary, I found that the preferred pronunciation is 'PO'-POO-RE.' You can also call it 'POT'-POOR'-i.' Anyhow, I picked that title because at the time, I had no idea what I would talk about tonight. And I won't be surprised if, when I'm finished, most of you people have the impression that I still don't know what I'm talking about!

"If I were in voice, I might entertain with the theme song of a friend of mine — 'Little Bill,' who has become the advertising spokesman for Commonwealth Edison. I have hanging in my office, a paternity certificate designating me as the father of 'Little Bill.' I like the self-flattery of looking up at that certificate every once in a while, but I must confess the little fellow is not a creature of my brain alone. In fact, he is a creature of many persons. 'Little Bill' was introduced to the Chicago area public in January, 1955. In his first appearances, he told how Commonwealth Edison keeps the cost of electricity down while everything else goes up. His message today is primarily the same as it was in 1955 and will be, we hope, in 1995.

"As I say, 'Little Bill' was not the exclusive invention of any one person. He was conceived in a number of brain-picking conferences between our people and those of the Leo Burnett Agency, and so was the creature of several individuals. They tell me that out of such collective efforts, the best advertising ideas are born.

"'Little Bill's' voice was, and still is, that of a Park Forest housewife. Her husband, incidentally, turned up one day at our Harvey office to register a small complaint about the size of his light bill.

Dresden

"But, I decided I couldn't keep you interested in 'Little Bill' for the full fifteen minutes allotted me, so I gave up that idea and began to think about discussing our Dresden Nuclear Power Station. I relaxed, however, when I remembered that Mr. Heckendorn said my talk could be non-technical and would not be interrupted for questions. Dresden has meant a great deal to Commonwealth Edison in the area of public relations where I work. It has been a medium of wonderful publicity. In June, 1957, we staged two ceremonies in connection with the start of major construction at Dresden, which we believe reflected credit on our company. Now we are thinking in terms of getting ready for the dedication of Dresden after it goes into regular operation in mid 1960.

"As you know, the first chain reaction was attained in this plant on October 15 last. I have learned to be very glib in telling people that Dresden has gone critical. When one of our engineers phoned me at 2:30 in the morning to announce the first chain reaction, my wife asked me what the call was all about. I told her Dresden had gone critical and she said, 'That's too bad, after all the hard work you put into the plant.' So you engineers will have to come up with a better term to describe such a situation.

"As you may have read, we were recently licensed to bring the reactor up to 50 per cent of its full power.

"We expect to move along successfully with the testing and loading processes, and hope to go into commercial operation in June of 1960—some six months ahead of the scheduled completion date. At the moment, we are not encouraging tours to Dresden during

the loading of the reactor, but after it's in full operation, we'll be happy to have you inspect our pride and joy.

"Recently you may have read of a visit of Russian atomic experts to this country, during the course of which they inspected Dresden. They were accompanied there by Mr. John McCone, chairman of the Atomic Energy Commission. Upon his return to Washington, Mr. McCone wrote our Mr. Joslin that Dresden had proven to be a remarkable demonstration of this nation's know-how in the field of atomic power—and he stated that he was writing the White House and the State Department, telling them of the great job that has been accomplished at Dresden and the fine impression it made upon the Russian scientists.

"As you may gather, therefore, Dresden is a source of pride and gratification to our organization, and I don't feel immodest in praising it because the major credit goes to your contemporaries in our organization—the engineers and the technicians—who have so ably conceived and constructed this exciting new project.

Frank Pace

"As I thought of the Russians and their accomplishments and their serious challenges to us, I remembered a talk I heard not too many weeks ago. The speaker was Frank Pace, former secretary of the Army and now chairman of the Board of General Dynamics. He said he was touring the country in an attempt to alert areas of influence to the threat Soviet Russia and Red China pose to our freedom and liberty.

"These two countries, with our own, he said, are the dominant nations in the world today. He described their growth and development as equaling that of any civilization in history—not in terms of the good of man, but in terms of accomplishing their own fundamental objectives.

"For instance, he stated that the brutal industrial experiment in which the 600 million Red Chinese are engaged, makes the Industrial Revolution in England a mere exercise. The national objective of these two nations is to destroy the United States of America and the free world we lead.

"He described the threat as two-pronged. The first is military, which includes the inter-continental ballistic missile and the thermo-nuclear bomb.

The second is the struggle over the remaining years of this century for complete dominance of the souls, minds, and bodies of all people.

"Fortunately, he estimated we will probably be able to generate, with our strength, the equivalent of a thermo-nuclear stalemate. Unfortunately, he is not as optimistic that we will be successful in the second phase unless this generation prepares for a prolonged conflict in economic and ideological areas.

"When his talk was over, he was asked by one of his listeners—a leading industrialist—'What can I, as an individual, do to help meet this danger?'

"His reply was that he could not tell each individual what his contribution should be. He said, in effect, that each person must, like that cigarette smoker, be a man who thinks for himself.

Counseling

"Just as an example of what people can do, I would like to cite the case of an associate of mine who is in the room tonight.

"He has taken on as an outside project the counseling of a young engineering sophomore at M.I.T. He meets with him, discusses and advises as to the courses he should take, the progress he is making, and his aptitude for the various engineering fields.

"There is no one in this young man's family circle able to give him this sort of counseling. Yet because this friend

of mine is willing to make the effort and take the time, the student is getting the consulting service of a man who is admirably fitted by training and experience to give it.

"There is no question in my mind but that this student, as a result of the arrangement, will be far better qualified to provide leadership in this changing world.

"This is just one thing that one man is doing. You men in this all-important engineering and technical field, it seems to me, have a great opportunity to contribute to our youth training. No group can do more than you to develop among the young men and women of the next generation, the kind of leadership required if this nation is to win the coming ideological conflict which Mr. Pace described."

Technical Sessions

Earlier, we mentioned that "The Cutting Edge" was presented at one technical session. The Mechanical Engineering Section, with Sidney Mayster as chairman, sponsored the session.

The second technical session concerned "Power Circuit Breakers—Their Development and Design." Earl B. Rietz, assistant to the vice president of engineering, I-T-E Circuit Breaker Company, spoke. The Electrical Engineering Section, with Edgar Rogers serving as vice chairman, acted as sponsor.

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ENGINEERING EDUCATION FOR THE FUTURE



By Dean Harold B. Gotaas

The engineering profession and education for it have been undergoing a transition involving more rapid change than at any time since the profession was first chartered by the Institution of Civil Engineers in 1828. The impact of scientific and technological development during the past two decades, the efforts of Russia in supporting its military and industrial developments with extensive programs of scientific and technological education and the accomplishments resulting from these efforts have produced much publicity concerned with the need for large numbers of engineers and scientists in our industrial society. It is obvious that there will be an increasing need for engineers and scientists in the highly mechanized and industrialized civilization which we will have in the future. Estimates have been published indicating that there will be a ratio of one engineer per 40 people by the year 2000. Probably most of the number required to meet such a ratio would be technicians rather than engineers. Today a large number of engineers are in work which could be done by less well prepared technicians. Contrary to much of the publicity which generally implies that the number of engineers is inadequate and that the more important technological problems will be met by producing large numbers of engineers, I believe that the need for numbers alone

is being adequately met and will continue to be met. There is still considerable room in many of the engineering schools of the country and as the demand increases more good students will be attracted to the profession. We have extensive information concerning the large numbers of engineers being turned out in Russia. There had been a great shortage of engineers in Russia and they are beginning to more adequately meet their needs. The thing that bothers me about engineering in Russia is the extensive and thorough education they try to provide their engineers.

Most Important Need

The most important need facing the United States is for more highly educated engineers for advanced areas of creative design, research, development and technological management in order that we can maintain maximum progress in advanced industrial, military, and environmental, scientific and technological activities. At the frontiers of science and engineering, quality is more important than quantity. To meet this need for people in the advanced development and design fields many more of the engineering graduates should receive considerably more education in advanced areas of science, mathematics and the art of engineering related to creative work in new fields. Research, development, creative

design, technological management and decision-making involving synthesis and analysis in pioneer and frontier areas will set the pace of technology in society. We need engineers to charter the route for new, novel and advanced developments. Many engineers will be needed continually in the mature and more stable fields of engineering practice, and our present educational programs are adequately meeting these needs. The important consideration, at present, is that more advanced education is essential to correct the deficiency of engineers for work in the advanced pioneer areas which have been developing.

Harold B. Gotaas is Dean of Northwestern University's Technological Institute in Evanston, Illinois. He presented this talk before the General Meeting of the Western Society of Engineers on Oct. 27, 1959 at the Society's Headquarters in Chicago.

I will not belabor the nature of engineering, but in discussing future engineering education needs, we should consider for what we are educating. The scope and nature of engineering are so broad that we have great difficulty delineating its boundaries. Sometimes our wives question our professional standing when we cannot repair household equipment or do not know what is under the floor board of the car. Engineering activities vary in novelty and creativeness from applications of well-established principles in mature fields of engineering to achieve the same results at lower costs, and adapting established methods to new conditions to creating and developing new technology based on the latest discoveries in the physical sciences, mathematics, biology, economics, physiology and psychology. Engineering is the synthesis of knowledge, experience, and judgment in creative design, planning, and development involving responsibility for decision-making and the wise use of natural, financial and human resources. There would be no need for an engineering profession if all new machines, circuits, structures, processes, plants and systems, highways, mills, instruments, etc. could be merely replicas of those in existence or would be acceptable at the same cost and performance. The primary reason for the existence of the engineering profession is to increase productivity and to improve man's environment, thereby raising the standard of living with more benefits at lower cost measured ultimately in terms of human effort.

Personal Qualities

The personal qualities important in an engineer are similar for all engineers regardless of whether he plans to work in the more mature areas of engineering or in the novel and advanced areas of technology involving creative synthesis, research and development of new concepts, and the translation of new knowledge into technological and human progress. These common qualities include integrity, strong motivation, perseverance, sound judgment about physical phenomena, a common sense understanding concerning people and society, and character for leadership. People who possess these qualities can practice in many of the very important but more mature areas of engineering even though

A new hypersonic gun may aid in the development of materials for rocket nose cones, declares "Chemical Week." The gun will drive projectiles at speeds up to 20,000 feet a second.

their scientific and technological education is limited.

The required educational base for high quality practice in the more mature areas is increasing. To produce accomplishments in the frontier areas of engineering and technology today, greater knowledge of science, mathematics, and the more advanced engineering sciences, as well as originality and creativity are essential. The gap between science and engineering, which was formerly quite wide, is rapidly closing. In fact, in many areas of technology, science today is engineering tomorrow. For many years, engineers produced new processes, machines, structures, etc. for society without having the basic scientific information desired for their development. Today, as science and technology have

become more complex and advanced with parallel translations of knowledge back and forth between science and technology, fundamental education basic to the newest concepts of science has become necessary in the advanced developmental areas. One should not assume that one part of the engineering spectrum is more important than another since society needs each function. However, it is believed that the greatest talent deficit for the future is in that part of the engineering spectrum dealing with advanced development and creativity. Greater attention in engineering education should be concentrated on advanced technology in order to meet the complex and rapidly changing future requirements.

Fortune Magazine (February, 1958) reported results of a survey which showed that 45.8 per cent of the top executives of the United States have an engineering background. At about the same time the National Science Foundation reported that about 25 per cent of the engineering profession are in research and development activities. Our situation in a divided world requires that advanced technological development activities be staffed with people whose education and experience provide the scientific and creative competence for solving the complex problems of the future. The traditional four year engineering educa-

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tion program is now being found to be insufficient base for progress in the advanced fields of technology.

Complexity, and Engineer's Role

The increasing complexity of society and the engineer's role in it may be measured by the rate at which man impinges on man. Some indices of this increase are total population, transportation speeds, and communication volume. The population of the globe has doubled once every 100 years for the past 200 years, and is now increasing at a rate which corresponds to doubling once every 42 years. The population per square mile in this country has increased from 17 to 24 per cent and then to 50 per cent in successive 100 year periods. Of perhaps greater significance is the fact that the urban population has increased from 17 per cent of the total in 1850 to 63 per cent in 1950 and is predicted to be nearly 75 per cent by 1970. Transportation speeds have risen from 40 to 350 miles per hour in 100 years and soon may be in the thousands of miles per hour. Telephones have increased from one to 55 million in 50 years and other instruments such as the radio and television have increased communications even more dramatically. Productivity and power development show a similar exponential increase. Waiting for exploitation just around the corner are extensive engineering developments which involve space technology, greater use of nature's forces and materials, more extensive use of energy and matter, heat conversion directly to electricity and reversing the process, nuclear power photosynthesis, computer and information theory for developing electronic brains which will make some decisions and control some processes better than man, new approaches to food production, safe control of transportation and many other technological developments based on scientific discovery.

That the pressure of the future is always underestimated, Greenwalt states: "When anyone in the past has attempted to predict the long term future, the forecast has turned out to be hopelessly shortsighted and pessimistic. Benjamin Franklin, for example, thought at the time of his life that it would perhaps take centuries to settle the American continent. The state of California stands as a monument to his error. Thomas Jefferson announcing the Louisiana Pur-

chase felt that the territory might be fully occupied after twenty-five generations. The railroad and the steamboat opened it up to settlement within a few decades. In the early 1900's a gentleman from Philadelphia grew enthusiastic about private motor cars and foresaw the time when there would be a hundred or so in every city. He viewed this development as a boon to highway safety as it would free the country from drunken drivers and wild horses. The British socialists during the 19th century foresaw the period when it would be unnecessary for children to work more than 10 hours a day.

"I could go on with similar examples—it should be evident that the progress of genius and inventiveness is something that is always underrated."¹

Educational Program

To meet adequately the engineering challenge of the future, at least 25 per cent of the engineers should receive education equivalent to the present Master's degree program which would require at least five years and be oriented toward traditional fields of engineering. Some of these engineers would work in the advanced technological fields, but most of them would become leaders in the practice of the more mature fields of engineering. Another one-fourth of the output of engineers should be educated

1. C. H. Greenwalt, *Challenge Magazine*, March 1954.

Japan plans to build a \$223.3 million trunkline railroad between Tokyo and Osaka for 100 mph trains, reports "Engineering News-Record." The trains will offer the same over-all time of three hours as an air-line now servicing the two cities.

for advanced development, research and creative engineering requiring six to seven years of educational background, providing an education equivalent to the doctorate degree. For the remaining half of the profession a stronger and more fundamental four year educational program would be adequate. Naturally, some of the less extensively educated engineers who are able and highly motivated will eventually acquire the knowledge to work in the frontier areas of technology and some of the more highly trained will not work in the advanced areas. However, the greatly needed supply of people for work in advanced and novel areas can be provided best through more advanced formal education.

For students interested in advanced and novel technology, science and math-

Notice

Please note: the Ladies Night—Bazaar and Travel Program was scheduled for Jan. 29, 1960 on Page 26 of the Midwest Engineer Directory Issue. That date has been changed—you will be notified of the new date as soon as it is released. Keep watching for it!

ematics should provide a strong base in differential equations, statistics, complex variables, computer methods, systems analysis, advanced nuclear and solid state physics, and physical and organic chemistry. Engineering sciences should include advanced level work in the science of materials, mechanics of solids, fluid mechanics, thermodynamics, electrical sciences and heat, mass and momentum transfer. Other methods of analysis should be taught in conjunction with application and creative design.

Creative design and synthesis studies beginning early in the program and continuing throughout the educational period with greater emphasis in the later years should be planned to develop the students' capabilities to focus knowledge from different fields on a problem and to seek out needed information not yet acquired. Design and synthesis together with fundamental science, mathematics and analysis form the base for advanced technology.

Students progressing to advanced levels should have considerable work in laboratory experimentation to first demonstrate basic scientific principles and later, as they progress, to develop their ability to plan and execute experiments which will test ideas, designs, and analyses they have developed.

In Cooperation with Industry

A work-study program in cooperation with industry and government is a most important part of education for advanced technology. Knowledge of organization, relationship between theory and practice, finances, labor productivity and management cannot be provided well in the university and should be acquired during the basic education period through cooperative work-study. After an engineer graduates, it is often difficult to obtain these basic experiences which he can get through cooperative work-study programs.

General education and communication skills should be acquired by studies throughout the educational period. These should include written and oral presentations, English and a foreign language, social science and humanistic courses suited to the student's level of maturity and designed to stimulate and prepare him to acquire further knowledge in these areas as he continues his professional career.

Specialization in the different branches of engineering could be acquired by

Keeping homes and offices bug and rodent-free is an expensive proposition in the United States, reports "Chemical Week." There are 5,000 exterminating companies in the country that split \$150 million in business a year.

selected courses in the advanced engineering sciences and through the creative design and synthesis problem work which would be oriented toward different fields by the types of problems undertaken. It is doubtful if specialization in the particular branches of engineering is as important for people working in the frontiers of technology as it is for engineers working in the traditional fields.

Working knowledge of principles and ability to apply and project them by synthesis rather than memory of facts and analytical procedures should be the academic keynote.

Many of the aspects and ingredients of the program outlined for work in advanced technological areas are provided to some extent in different pro-

grams but little has been done to combine high level advanced science with creative design. Since there is a break in the educational program between undergraduate and graduate work, there are no programs that I know of which attempt to combine the highly scientific studies and applications with creative design and research through much of the present undergraduate programs. More often the programs tend to emphasize either the highly scientific or practical design at any particular time depending upon the particular faculty. Coordination of the scientific and analytical with creative design requires careful planning among several faculty. There are problems of faculty interests, viewpoints, and experiences to provide both the scientific and creative design work. This type of program would not match well with most of the conventional programs. However, it is believed that education for advanced levels of technology for qualified students can be improved by greater emphasis on both advanced scientific studies and creative design arranged so that analysis and synthesis are taught in parallel.

Better Tires

A new chemical has been developed that is said to reduce cracks in sidewalls and treads of tires, reports *Fleet Owner*.

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Aero-Dist and Hydro-Dist Aid Engineers

Two new surveying instruments have been developed for the civil engineering profession, each designed to crack a variety of preliminary engineering problems.

One, the "Aero-Dist," is a device for measuring ground distances from the air. It will enable surveyors to carry their lines across bodies of water or to jump over areas of inaccessible terrain in order to establish ground controls (or "bench works") for construction of power plants, highways and irrigation schemes in remote places. Thus, months may be cut off the preliminary engineering job involved in bringing a huge development project in the wilderness to the construction stage.

The other instrument, the "Hydro-Dist," is a device to measure distance from land to sea points. It may be used to provide continuous location data to construction men on offshore projects. Heretofore, it has been difficult to maintain precise location of offshore work because traditional surveying instruments depend upon visibility, and fog between the job and shore stations could force a delay until the weather cleared. The new radar-like instrument is unhampered by fog.

The "Hydro-Dist" is also able to provide continuous location of a moving vessel, and thus is expected to expedite offshore oil exploration operations.

Both devices are electronic systems, based on the principle of the Tellurometer System, introduced two years ago for general over-land survey work. A series of high-speed impulses are transmitted from a small master unit at one point to a remote unit at the other point. The time it takes the micro-waves is recorded in billionths of seconds, then translated into miles, feet, and 10ths of feet.

The "Aero-Dist"

The "Aero-Dist" consists of a master unit carried by a light plane or helicopter, and two (or more) remote units on the ground. The theory of its operation is simple: Assume an area of inaccessible or heavily forested terrain up to 150 miles wide. The distance across must be precisely measured, in order to carry horizontal control to the job site. A remote unit would be set up at each edge of the area. The airborne

master unit would be flown across the non-intervisible line between the two stations transmitting micro-waves simultaneously to both remote units. As the plane approached the line and crossed it, a series of measurements to each remote unit would automatically be recorded at the master unit. The straight line between the two ground stations would show up as the shortest distance.

Thus, horizontal control for a construction project could be carried over a mountainous or forested area by one short flight. A similar accomplishment by traditional ground methods could take several weeks, or months.

Another potential use would be to maintain a continuous record of the exact location of a plane taking aerial photographs at exposure intervals. This would be of considerable value to photogrammetrists, plotting highway route locations by aerial methods. Again, weeks of ground control work could be eliminated.

(A tri-plex system has also been developed utilizing three ground units. This would permit surveyors to establish two or three entirely new positions in relation to each other, or a third position in relation to two existing positions. The value of this application would be in extending existing horizontal control. This technique is actually equivalent to

trilateration from the air, inasmuch as it is the measurement of the distances between points (or sides of a triangle), with proper allowance for the elevations involved — the plane and ground stations.)

The "Aero-Dist" has been designed to produce an accuracy of 1:100,000, plus-or-minus one meter, far in excess of normal engineering requirements.

The "Hydro-Dist"

The "Hydro-Dist" is reported to be the first device capable of providing continuous location of a moving vessel. It is expected to replace largely the sextant angle procedures used in hydrographic (offshore) survey, where its chief advantage is its ability to operate through fog or darkness.

As in the case of the airborne "Aero-Dist," distance is determined by means of radio magnetic impulses, in this situation from the vessel (or offshore job site) to remote stations on shore.

A semi-permanent installation could be used by engineers concerned with keeping a dredge on course in a river or harbor. Remote units on shore could be installed to provide continuous location data to the dredge. Operators would not be required to man the shore stations, and inclement weather or darkness would not hamper the system.

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U.S. Steel To Produce "Wider Plates"

A new rolling mill to produce steel plates wider than any now available throughout the world will be built by United States Steel Corporation at its Gary Steel Works, it was announced in Pittsburgh by E. H. Gott, executive vice president-production.

Construction of the new facility follows U. S. Steel's announcement last year that engineering planning had been instituted for a new wide plate mill in the Chicago area.

"The increasing demand for wide plates of improved quality and in larger quantity than now available has been so great that the Corporation decided to take immediate action," Mr. Gott said.

He stated that the new facility is designed as a combination 160" and 210" wide plate mill. This provision for rolling and flattening at either width is a steel industry "first" adopted by United States Steel in order to obtain exceptional plate surface quality and flatness

on the full range of products from the mill.

Advances in fabricating techniques have indicated a growing need for plates in widths that will be available when the new Gary mill is in operation. Wide plates make possible greater design flexibility, thus reducing fabricating costs and improving end products made principally from steel in plate form.

In addition, the new mill will satisfy the rapidly increasing demand for heavy plates since it will be capable of rolling single plates weighing as much as 60,000 pounds.

The mill will be capable of rolling all grades of U. S. Steel's diversified plate product line including carbon steels, high strength steels such as cor-ten, manten, and tri-ten, as well as alloy and stainless grades.

National defense will benefit from the availability of wide plates for the construction of surface ships, submarines,

atomic energy installations, and the missile program. Other uses of the wide plates include pipe lines, highway bridges, refinery equipment, tanks, boilers, pressure vessels and a wide range of heavy machinery and construction applications.

The 4-high combination mill will replace a 160" plate mill built at the Gary works during the First World War. Construction of the new mill, which is scheduled for completion early in 1962, will not interrupt production on the present facility at Gary works.

Capital Goods Evolution Quickens

The pace of new capital goods product evolution will quicken as we leave the 1950's and enter the 1960's, predicted William F. Crawford, vice president of Rockwell Manufacturing Company (Pittsburgh), and president of two Rockwell subsidiaries, Edward Valves, Inc. (East Chicago, Ind.) and Republic Flow Meters Company (Chicago).

Speaking at Edward Valves' "Selling In The Sixties" Sales Meeting in Chicago recently, Mr. Crawford also predicted that "profit life" will emerge as the important yardstick determining product survival. New capital goods products will remain competitive no longer than five years without major redesign. True profit will be earned only on sales volume above a minimal level, and corporate success will depend on peoples' abilities to do new jobs tomorrow rather than how well they do their present jobs today, he said.

Increasingly greater push behind research and development programs and more efficient marketing will be necessary to relieve competitive pressures and to assure corporate survival, but will shorten the economic life of products, Crawford forecasted. Research and development will accelerate competitive obsolescence. Buyers of capital equipment will be forced to replace useful goods with newer, more efficient equipment to produce competitively. Equipment suppliers, in turn, will have to update product features faster to remain competitive.

More efficient marketing of industrial products, Crawford said, will increase

"TEAM," A Novel Association

As a novel kind of association, Herbert W. Graham, formerly vice president of Research, Jones & Laughlin Steel Corporation, announced recently the formation of a new research consulting organization under the name Technically Experienced Associates, Mobilized, or "TEAM, Inc."

"Members of the organization are retired research executives of some of the largest industrial companies in the United States. They have formed this association to make their wide research experience available for the benefit of mankind, without entering into competition with commercial consulting organizations or individuals," Mr. Graham said.

"TEAM" members offer their services in these general research and advisory fields: research management, scientific and technical education, public health, national defense, conservation of human and natural resources, and scientific matters of national and international interest.

"TEAM, Inc." has a special interest in the area of superannuation, with its attendant problems of education, rapid population growth, and an increasing number of older citizens requiring sup-

port by a declining proportion of younger, income-producing people.

The firm is already arranging its first major studies, one in the field of government and one in education, which are expected to be announced shortly.

Officers of "TEAM," in addition to Graham as president and chairman of the Board of Trustees, are F. W. Blair, formerly director of Research and Development, Procter and Gamble Corp., vice-president, and Dr. Norman A. Shepard, formerly chemical director, American Cyanamid Corp., secretary and treasurer.

"TEAM, Inc." is sponsored by the Dorr Foundation, which is a non-profit organization founded by Dr. J. V. N. Dorr, of the Dorr-Oliver interests. Dr. Dorr is well known as inventor of the Dorr thickener.

In keeping with the purposes and objectives of the organization, "TEAM" members offer their services at cost plus a small overhead to cover office expenses. The central office of "TEAM" has been established at 99 Park Avenue, New York 16, N. Y. The organization will welcome as additional members retired research executives from broad fields of professional and scientific activity.

the pace of competition among producers of goods and services by making knowledge of more efficient products and processes more quickly and widely known. The job of capital equipment producers will be to keep their product

mix and product features new, and to make their customers aware that they can buy updated equipment that will produce more efficiently than the equipment they already have.

Success in the Sixties, Crawford pre-

dicted, will come to those firms whose present plant, equipment, and people are best suited to future jobs rather than to those firms who are concerned only with the jobs they are performing today.

American Viscose Aids 83 Institutions

Eighty-three colleges and universities will benefit from American Viscose Corporation's aid-to-education program this year. Commenting on the program for the 1960-61 academic year, Henry H. Bitler, vice president, said, "As a chemical-process industry, producing man-made fibers and packaging films, American Viscose values the scientific education and appreciates the importance of industry participation in its future. As in previous years," he stated, "scholarships, fellowships, grants-in-aid, and assistance through educational foundations are included in our program."

American Viscose Corporation's program is designed to aid these educational institutions in their over-all programs and encourage the study of science and engineering. The recipients of the scholarships and fellowships are selected by the schools on the basis of scholastic merit and need. American Viscose takes no part in this selection, nor are the students under any obligation to the corporation.

Scholarships valued at \$500.00 each have been awarded for undergraduates

who are majoring in chemistry, physics, engineering, textiles, and business administration. Fellowships for graduate work, ranging from \$2,000.00 to \$2,800.00 have been established in the fields of chemistry, chemical engineering, and cellulose chemistry. Unrestricted grants-in-aid have been awarded to three foundations: Pennsylvania Foundation for Independent Colleges, Inc.; The Virginia Foundation for Independent Colleges; and the West Virginia Foundation for Independent Colleges.

Other Institutions

In addition to the schools represented in the three state foundations, the following institutions have been invited to take part in the program during the 1960-61 academic year: Allegheny College, Carnegie Institute of Technology, Cornell University, University of Delaware, Georgia Institute of Technology, Jefferson Medical College, Lehigh University, University of Maine, Mary Washington College of the University of Virginia, Massachusetts Institute of Technology, McGill University, Morris Harvey College, North Carolina State

College, University of Pennsylvania, Pennsylvania State University, Philadelphia Textile Institute, Tufts University, and Virginia Polytechnic Institute.

Good Service

Universal telephone service to and from moving vehicles "will become practical as well as technically feasible for the first time," if the Federal Communications Commission makes available a large block of radio frequencies, the Fall General Meeting of the American Institute of Electrical Engineers was told in Chicago on Oct. 14.

The Possibility . . .

The FCC is now exploring "the possibility" that such frequencies be made available, Alan F. Culbertson, Lenkurt Electric Co., Inc., San Carlos, Calif., told a symposium on wire communications, in a paper, "The Challenge of Universal Mobile Communications."

The new system, which would be a two-way one using dials, will be a joint venture of some 4,100 operating telephone companies in the United States, dozens of manufacturers of system components, and the various laboratories which contribute long-range system planning for the telephone industry.

"A peculiarity of this type of service," he said, "stems from the fact that roughly two-thirds of the territory to be covered by a universal mobile communications system is served by independent telephone companies. This means that a great deal more coordination between companies is going to be required than any previous program of similar scope."

At present mobile communications is of the talk-listen-talk type.

"Growth of the un-wired telephone service can begin as soon as an adequate 'right-of-way' is obtained through the frequency spectrum to reach subscribers whose telephones can not be anchored in place," he commented.

Agree On Griffin Wheel Process

Joseph B. Lanterman, president of American Steel Foundries, announces the signing of an agreement between Griffin Wheel Company, a wholly owned subsidiary, and U. S. Steel Corporation that will enable the steel corporation to explore the adaptation of Griffin's patented process for controlled pressure pouring to the manufacture of semi-finished steel mill products.

The Process was developed by Griffin Wheel for the manufacture of steel railroad freight car wheels. During the past six years, five steel wheel plants have been constructed and are now in operation—three in the United States and two in Canada. The system of pressure pouring steel into permanent graphite molds forms a wheel so accurate that no machining is required on

the tread or other external surfaces.

Initial experiments conducted by U. S. Steel and Griffin were promising enough to warrant further research on the adaptation of the Process to the pouring of steel from its molten state directly into semi-finished mill shapes, such as blooms, slabs, billets, and tube rounds. It is expected that research over a period of from one to two years will be necessary to determine whether a feasible and efficient method of steel production can be developed.

American Steel Foundries and its subsidiaries, Griffin Wheel Company, Griffin Steel Foundries Ltd., Diamond Chain Company, Inc., Pipe Line Service Corporation, and South Bend Lathe, Inc., operate 27 plants in 15 states and Canada.



News of Engineers

Western Society member **Leonard L. Ruggles**, chief telephone engineer for Automatic Electric Company, has retired after nearly 41 years of service.

Holder of 13 U.S. patents, Ruggles is credited with important developments in automatic switching systems during his career with the manufacturing firm, a subsidiary of General Telephone & Electronics at Northlake. In 1954, he was the recipient of the Talbot G. Martin Award presented by the Strowger Automatic Club, an employee organization, for his outstanding contributions to the art and science of communications.

A veteran of World War I and graduate of Purdue University, Ruggles is a member of Tau Beta Pi and Eta Kappa Nu, honorary engineering fraternities, and is a fellow in the American Institute of Electrical Engineers.

Fellow employees—some 120 strong—honored his retirement with a banquet held at the Elmhurst Country Club, November 30, where he was presented with a plaque commemorating his outstanding service to the company, by President Herbert F. Lello.

William James, vice-president of the Scherr-Tumico Co., of New York and St. James, Minn., announces the opening of a new sales office in Chicago. Located at 5045 W. Harrison, Chicago 44, Ill., the new office, alike the three other "Coast-to-Coast" locations of the Scherr-Tumico Co., will not only handle sales, but will also carry a full warehouse stock, as well as showroom and teletype service between New York and Minnesota.

Dale W. Freyberg, district Sales Supervisor for over 10 years, for Illinois and Wisconsin, for Tubular Micrometer Co., of St. James, Minn. will be in charge of this new Scherr-Tumico Co., office for the Mid-West region.

Paul Weir, member of WSE, chairman of the Board, and J. P. Weir, vice president, of the Paul Weir Company,

20 North Wacker Drive, Chicago, returned from Australia in late November. The purpose of their trip was to examine and evaluate a group of three operating mines and adjacent reserves near Sydney, New South Wales, for potential purchase by a major Australian company.

Other countries in which the Paul Weir Company is engaged or has been active in recent years include Brazil, Colombia, Korea, South Vietnam and Turkey.

Rudolph J. Napolitan has been named general manager of the National Electronics Conference, announces Virgil H. Disney, NEC president.

Mr. Napolitan was formerly general sales manager of A.R.F. Products, Inc., and assistant general sales manager of Permoflux Corporation.

The National Electronics Conference is an international forum held annually in Chicago to report latest progress in electronics research, development and application. Its technical sessions and exhibits are attended by over 10,000 engineers, educators and executives representing industry, universities and government.

NEC is sponsored by the American Institute of Electrical Engineers, Illinois Institute of Technology, the Institute of Radio Engineers, Northwestern University and the University of Illinois, with participation by Electronic Industries Association, Society of Motion Picture and Television Engineers, Michigan State, Michigan, Notre Dame, Purdue, Wayne State and Wisconsin universities.

WSE member **Robert C. Meissner** has been named president of Meissner Engineers, Inc., Chicago, it has been announced by **John F. Meissner**, chairman of the board. Robert Meissner was previously executive vice president of the firm and administrative officer for all projects in consulting and design.

The firm was founded by John F. Meissner, also a WSE member and his

son Robert C. Meissner in 1949 as the outgrowth of the elder Meissner's work as an individual engineering consultant, specializing in bulk materials, handling and process plant design. Beginning as a two-man operation, it has grown into an organization employing a staff of more than 200 engineers.

As president of the firm, Robert C. Meissner will assume full administrative responsibility for the two Meissner engineering divisions; industrial process plant design and bulk materials handling (including mineral beneficiation) and civil engineering (including highways, major bridges, flood control, and sewage disposal).

After receiving his bachelor of science degree in mechanical engineering from

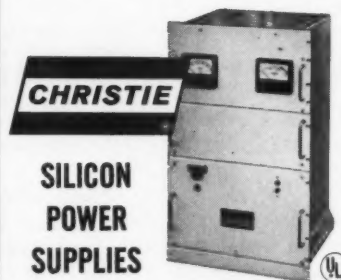
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the Massachusetts Institute of Technology in 1943, Robert C. Meissner studied naval communications at Harvard College.

The Portland Cement Association at its Annual Meeting in Chicago on Nov. 18 elected five new members to its Board of Directors.

The new directors are: Chester S. Crawford, president, Whitehall Cement Manufacturing Co., Philadelphia, Pa.; L. R. Forbrich, general manager, Green Bag Cement Division, Pittsburgh Coke and Chemical Co., Pittsburgh, Pa.; Ellroy King, president, Halliburton Portland Cement Co., Corpus Christi, Texas; Frank B. Warren, president, Bessemer Limestone and Cement Co., Youngstown, Ohio; and W. S. Ziegler, president, Saskatchewan Cement Co., Ltd., Regina, Sask., Canada.

The Portland Cement Association, a national organization to improve and extend the uses of portland cement and concrete, is voluntarily supported by more than 70 companies manufacturing portland cement in the United States and Canada. Its activities are limited to scientific research, development of new or improved products and methods, technical service, promotion and educational effort and safety work.

Retiring directors are: Albert M. Andreas, chairman of the Board, North American Cement Corp., New York, N. Y.; B. F. Cox, vice president and general manager, British Columbia Cement Co., Ltd., Victoria, B. C., Canada; C. T. Fuller, chairman of the Board, Allentown Portland Cement Co., Allentown, Pa.; L. T. Welshans, general manager, Standard Portland Cement Division, Diamond Alkali Co., Cleveland, Ohio.

Paul Rogers & Associates, Inc., consulting structural engineers, announce that they have moved to enlarged new quarters at 5 North Wabash ave., Suite 1800, Chicago 2, Ill. The telephone number is Financial 6-0190.

W. G. Warne was named production control manager of Precision Transformer Corporation, 2218 West Lake St. in Chicago.

Warne was formerly production and materials control manager at the Pennsylvania Transformer division of Mc-

Graw-Edison in Canonsburg, Pa. He was an executive with the firm for 12 years.

An award of \$200 has been presented to Donald P. Grover, design engineer at Armour Research Foundation of Illinois Institute of Technology, for his paper on "How to determine pneumatic valve response."

Grover was cited for the award by *Applied Hydraulics & Pneumatics* magazine, which annually sponsors a Prize Paper Contest.

Most recently Grover has been project engineer on a program to design and develop a powder-gas operated drive with electro-pneumatic starting and braking mechanisms and controls for the Vulcan, a 20mm. aircraft gun.

David H. Moore, MWSE, former senior partner, Vern E. Alden Company, has announced the availability of services of Engineering For Industry, Inc., 208 South LaSalle St., Chicago 4, Ill. The phone number is ANdover 3-2183.

J. K. Lund has been appointed vice president, Research and Development Division of The Dole Valve Company.

Mr. Lund formerly was vice president and director of technical services. He joined Dole in 1927 as production engineer after attending the University of Southern California and Armour Institute of Technology. His home is at Northfield, Ill.

Dole Valve Company is a leading supplier of valves, thermostats, and controls to the appliance, automotive, and home building industries.

Appointment of John Robinson Davies as manager in Europe for Soiltest, Inc., Chicago manufacturer of engineering test apparatus, was announced by Theodore V. Van Zelst, president. Van Zelst is a member of the Western Society of Engineers.

Davies will head the company's operations in Europe, the Middle East, and Africa, with headquarters in Lausanne, Switzerland. Soiltest will also have a sales office in Brussels, Belgium, and a distribution center and stocking warehouse in Breda, The Netherlands.

Davies recently returned from an extensive trip to 17 African countries where he discussed marketing of Soiltest products with established sales repre-

sentatives. On the trip, he also appointed new sales representatives in countries where Soiltest had no representation. During the past six months, he has made similar trips through Europe and the Middle East.

A graduate of Oxford University, England, Davies has had many years of experience in the scientific apparatus industry.

C. M. (Cal) Basile has been elected president of Link-Belt Speeder Corporation, Cedar Rapids, manufacturer of power cranes and shovels, to succeed D. W. (Dave) Lehti, who retires after 25 years with the company. Link-Belt Speeder is a subsidiary of Link-Belt Company.

Basile has been with Link-Belt since 1928. He was employed in Link-Belt plants in Chicago and Philadelphia in various phases of manufacturing. Since coming to Link-Belt Speeder in 1950, he has been a director and vice president in charge of operations. Earlier this year Mr. Basile was elected executive vice president of the Cedar Rapids plant

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and president of Link-Belt Speeder (Canada) in Woodstock, Ontario. He attended Illinois Institute of Technology.

He is a member of the Cedar Rapids Chamber of Commerce, Elks, Engineers and Kiwanis Clubs.

Mr. Lehti has been identified with the crane and shovel industry since 1912. In 1925, he and a business partner acquired the New York distributorship for Speeder Machinery Corporation, then located in Fairfield, Iowa (moved to Cedar Rapids in 1926). He joined Speeder Machinery Corporation as a district sales representative in 1934 and became assistant plant manager in 1939, when the company was acquired by Link-Belt, and the name was changed to Link-Belt Speeder Corporation. He became vice president in 1946 and president in 1947.

The appointment of Herbert S. Johnson, Jr. as vice president in charge of marketing was announced recently by J. A. Holmes, president of Nalco Chemical Company.

Holmes said Johnson would coordinate and assist in the sales operations of various Nalco divisions. He also will work on advertising, marketing research, pricing studies and long-range planning.

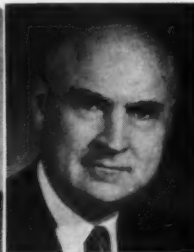
Leonard R. Robinson, Jr. was named to replace Johnson as manager of the industrial division.

Robinson had been field personnel manager for the company before his promotion.

Reorganization of Illinois Bell Company staff operations recently resulted in promotions for two members of the Western Society of Engineers.



BROSMAN



CUMMINGS

Blaine Cummings, general manager of Chicago area operations, was elected vice president and general manager. Granville P. Brosman, Chicago plant extension engineer, was promoted to chief engineer for company operations outside Chicago and its suburbs.

The changes were announced as part of a plan which created a Chicago suburban operations area and transferred headquarters for the reorganized state area from Chicago to Springfield.

Cummings joined Illinois Bell as a student engineer in 1923 following graduation from the University of Indiana.

Brosman began his telephone career in 1929 as an engineer in traffic engineering after graduation from Rose Polytechnic Institute.

Two new assistant directors in electronics research have been named at Armour Research Foundation of Illinois Institute of Technology. The appointments were made by Virgil H. Disney, director of electronics research.

Named to the post in charge of computer development and controls systems, electrical machinery, components, and measurements was George T. Jacobi, formerly of General Electric Company, Phoenix, Arizona.

Harold H. Kantner, with the Foundation since 1951, was named assistant in charge of computer applications and operations research.

Jacobi, educated in Lausanne, Switzerland, and Ohio State University, spent 11 years with General Electric, the last ten of which were in close association with the computer art and development.

Kantner was educated at Reed College and did graduate work at the University of Chicago. Since 1951 when he joined ARF, Kantner has worked with control systems in the areas of missile guidance, flight simulation, and electromedical measurements. He has been supervisor of computer applications and operations research since 1955.

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THE NEW LOOK FOR THE LOOP

Mr. Alfred S. Alschuler, noted architect and designer of the proposed new governmental buildings for the Loop, will discuss this subject at the January meeting of the Civic Committee. He will have actual scale models of his design and will spice his talk with personal anecdotes.

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DINNER—6:15 P.M.

MEETING—7:00 P.M.

OVER BY 8:15 P.M.

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Reviews of Technical Books



Analog Computation

Principles of Analog Computation, by George W. Smith and Roger C. Hood, McGraw-Hill Book Company, Incorporated, New York 36, New York. Pages, 234. Price \$7.50.

This book contains detailed information on circuitry and considers a number of pertinent examples. It introduces several new techniques involving diodes, including a lengthy discussion of smoothing methods for diode function generators. It should aid those with a background in basic electronics and Laplace-transformation theory.

In writing this book the authors have drawn from many sources for the material they present. The main emphasis of the book has been placed upon the type of problems which can be solved with the belief that it will be helpful to a wide variety of users. Particular attention is paid to the fields of servomechanisms and particle dynamics. The analogy with analog computation is shown, which allows the researcher to solve mathematically units which previously were restricted to approximations. In particular, the text deals with d-c operational amplifier and the electronic differential analyzer. In the computers considered, the variables are represented by d-c voltages, with time generally used as the independent variable.

The fundamental tools for the analyst working in the field are emphasized in the eight chapters which interconnect analog-computation techniques. Principles discussed in the various chapters are Major Components of the Analog Computer, Problem Planning and Programming, Simulation of Linear Systems, The Use of Diodes in Analog Computations, Function Relays, Implicit-function Techniques, Arbitrary-function Generators and General Theory of Operation of Computer Components.

W.L.R.

Indeterminate Structures

Statically Indeterminate Structures, Approximate Analysis by Deflected Structures and Lateral Load Analysis, by Jack R. Benjamin, published by McGraw-Hill Book Company, New York 36, N.Y. First Printing, 1959. Pages, 350.

This book, as the title implies is mainly concerned with the approximate analysis of statically indeterminate structures using statics and the principles of deflected structures. To this end the details of sketching a deflected structure are fully explained and illustrated.

The procedures are fully developed in the first few chapters and their applications to specific structures such as continuous beams and rigid frames are explained in later chapters. Of particular interest is the chapter on shear walls the treatment of which is largely original material. This reviewer found the last two chapters very informative and

interesting. These two chapters deal with the philosophy of structural engineering, a short discussion of structural forms, and finally a presentation of relationships between analysis and design.

This is not intended to be an introduction to the subject of analysis of indeterminate structures hence it is of more value to a practicing structural engineer than an undergraduate college student. The fact that elastic and plastic analysis procedures have integrated treatment, and also the fact that no answers to the problems are given testify to this effect.

Computer Primer

Digital Computer Primer, by E. M. McCormick, McGraw-Hill Book Company, New York 36, N.Y. Pages, 214. Price, \$7.50.

Engineers interested in investigating the fundamentals of high-speed electronic computers will find this book of value.

Mr. McCormick describes the essential elements of the computer and discusses the basics of programming and coding, maintenance of accuracy, and checking of results. The electronic computer consists of an input, a storage, an arithmetic unit, controls, and an output. The computer does only what it is told to do through coding and programming.

Electronic computers have been and will continue to be used increasingly in engineering work. *Digital Computer Primer*, therefore, is of widespread interest.

Control Systems

Sampled-Data Control Systems, by Eliahu I. Jury. Published by John Wiley & Sons, Inc., New York 16, N.Y., 1958. Pages, 453. Price, \$16.00.

A basic theory applicable to sampled-data systems and allied fields such as circuits, networks, computers, and the general field of system engineering is developed in this book.

Dr. Jury treats in details both the z-transform method and the modified z-transform method of analysis, with a view to their application in a wide variety of fields other than feedback systems. The early part of the book is concerned with the analysis methods of the control system and a close examination of synthesis problems. The author then explores the applications of mixed digital-analog linear systems, digital computers in the control field, and the operational solution of linear difference equations. In this way, the volume provides a foundation for the solution and clarification of problems arising in mixed systems.

The study places emphasis on the organization, integration, and extension of material governing industrial control methods. The main theory is extensively augmented with examples and numerous problems.

New Products

As described by their Manufacturers

Class H Silicone Varnish

An all-new Class H silicone dipping and impregnating varnish that is as easy to process as most Class A and Class B varnishes has just been announced by Dow Corning Corporation.

Designated Dow Corning 980 Varnish, this new material cures in only six hours at 150 C. This temperature is 50 C below that required for other silicone varnishes. In addition, run-off is substantially lower than that for other varnishes, assuring appreciable savings in equipment maintenance and clean-up time.

Despite its low curing temperature, this new varnish meets AIEE requirements for use in 220 C systems . . . has greater heat stability than any other varnish known. In addition, it resists moisture and is unaffected by many corrosive atmospheres.

According to Dow Corning, this new varnish will make it possible for original equipment manufacturers and service shops to produce Class H units on production equipment designed for Class A and Class B equipment. The high temperature curing ovens previously required to process Class H varnishes are not needed for this new varnish.

Supplied as 59% solids in diacetone alcohol, Dow Corning 980 Varnish has a higher flash point than xylene or toluene impregnating solutions.

When used with other Class H components in power transformers, servomechanisms and electronic devices designed for higher temperature rise, the greater thermal stability of Dow Corning 980 Varnish permits smaller, lighter weight, more reliable units.

Production Machine Tool

Introduction of a new metalworking machine tool that marks a significant step forward in industrial technology has been made by the Ex-Cell-O Corporation of Detroit.

The machine is Numera-Trol 922, said by Ex-Cell-O to be "the most accurate production machine tool in the world."

Latest in the line of numerically-controlled machine tools, Numera-Trol 922 is a contouring machine, designed

for precision turning, boring, and grinding, and capable of being controlled—either electronically or manually—in increments of 25 millionths of an inch.

According to Ex-Cell-O engineers, radical departures from normal production techniques were adopted in the construction of the machine to make it capable of such accuracy of control. Among these departures were the design and construction of the machine bed, and of the flat and V-ways upon which the main slide and cross slide rest. The machine bed is heavier and more rigid than in standard machine tools, while the slide ways, in addition to being hand scraped to insure their being perfectly flat, incorporate precision roller bearings, matched to a few millionths of an inch to guarantee ease of movement and immediate, accurate response to directions from the tape control system.

Reflecting such care in design and construction is the fact that the cross slide, which weighs approximately 1,000 pounds, requires a pressure of only 5½ pounds to overcome inertia, and only five pounds to maintain movement.

To insure that the slide ways are parallel the machine is tested by an instrument which is accurate within 1½ millionths of an inch and checked regularly with the U.S. Bureau of Standards.

To maintain accuracy during production operations, Numera-Trol 922 is operated under a constant temperature of 72°F. Heat from the electronic equip-

ment is ducted away from the work area, and the hydraulic power unit is water cooled.

Other features of the new machine include its building-block design, with interchangeable machining units, one for turning and boring, the other for precision grinding.

Ex-Cell-O executives explain that accuracy of the degree of Numera-Trol 922 has become necessary through demands of missile and rocket development. Such accuracy is not possible with manually-operated machines, they point out, where differences in operators and variations within the machines may cause dimensional variations in the parts produced.

In addition to extreme accuracy, Numera-Trol also combines many other benefits of numerically-controlled machines, including lowered cost of short production runs, reduction of time necessary to change from one job to another, increased output, and improved quality.

In effect, the numerical control process brings the same benefits to short-run operations which automation brings to long-run jobs.

Ex-Cell-O's new contouring machines currently are in operation producing classified parts for American manufacturing firms.

Literature

Bolt Tension Calibrator

Design engineers will be interested in new literature now available from the Skidmore-Wilhelm Manufacturing Company, describing its bolt tension calibrator, now in use at Buick's plant in Flint, Michigan.

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tors Corporation found it could reduce threaded fastener inventory and still do a better job by duplicating actual production line conditions in the laboratory to test torque-tension relationships for different bolt, nut and washer combinations. The basic tool around which their testing equipment was built is the Skidmore-Wilhelm calibrator.

The free literature, a reprint of a feature article, may be had from Skidmore-Wilhelm Manufacturing Company, 442 South Green Road, Cleveland 21, Ohio.

Butterfly Valve

The Henry Pratt Company Bulletin 10EI is a new catalog which illustrates and describes the new Monoflange Mark II Rubber Seat Butterfly Valve. The catalog has been designed to be the ideal working tool for engineers and users of this type of equipment. Complete specifications, certified dimension drawings, water flow data, gas flow data, weights and freight rates, and prices are included. For your copy, write the Henry Pratt Company, 319 W. Van Buren Street, Chicago 7, Illinois—Attention: Advertising Manager.

Equipment Catalog

Soiltest, Inc., Chicago, manufacturer of engineering testing equipment, has just published the largest engineering equipment catalog in the company's 13-year history.

Containing 316 pages, almost three times as many as last year's edition, the new 1960 catalog describes over 3400 different items ranging from a small pocket sized soil penetrometer to completely equipped mobile laboratories and nuclear testing equipment.

The catalog also features approximately 1500 illustrations, with individual sections on equipment for testing soils, concrete, aggregate, and bituminous materials; mobile laboratories; general laboratory equipment; and drilling and sampling equipment. Listings include major equipment and all accessory items.

Referenced to ASTM and AASHTO specifications, the catalog contains recommended equipment lists for specific types of testing projects.

Soiltest will distribute the new catalog in 110 different countries to engineers, scientists, technicians, government agencies, municipalities, contractors, architects, builders, real estate developers, manufacturers, and research, educa-

tional, production, and industrial laboratories.

Copies may be obtained free of charge by writing to Soiltest, Inc., 4711 W. North Ave., Chicago 39, Illinois, U.S.A.

Equipment Manual

Precision Equipment Co. who regularly publishes handy pocket-sized Equipment Manuals as a guide to executive planning, is now making our readers a very special introductory offer of a free one-year's subscription to their popular Manual.

In the Equipment Manuals are described and illustrated the newest products and inventions for both plant and office. They include a wide selection of workbenches, the newest developments in adjustable steel shelving, new equipment and material handling inventions. Just a few minutes spent with each Equipment Manual as it's published will keep the executive aware of new products currently being marketed . . . a truly valuable service to the busy executive. A popular feature of Precision's Equipment Manuals is their special "Heard In The Locker Room" joke section and the sprinkling of famous cartoons to be found throughout its pages.

To obtain your free one year's subscription, just send your request to Precision Equipment Co., 4411 Ravenswood Ave., Chicago 40, Ill.

Steel Analyses

"Pocket Guide to Steel Analyses." A convenient pocket-size booklet, this twenty-page guide lists the compositions of forty stainless steels, 184 alloy steels and 105 carbon steels most often used in industry. It also contains important federal specifications with corresponding SAE, AISI and AMS numbers. Copies are available from: Reader Serv-

ice Dept., Stainless and Strip Division, Jones & Laughlin Corporation, Box 4606, Detroit 34, Michigan.

Aircraft Steels

A new booklet on the aircraft steels AM-350 and AM-355 is now being distributed by Allegheny Ludlum Steel Corporation, developers of these materials.

The 24-page booklet gives detailed information on the steels as to their mechanical and physical properties at various temperatures. Also included are sections on heat treating, fabrication, including forming, forging, welding, brazing, and machining. Numerous tables giving detailed data are included.

While most of the current production of these two steels goes into the aircraft and missile fields, both AM-350 and AM-355 can be used for other applications, including flat and coiled springs, corrosion resistant fasteners, dental and surgical equipment, saws and saw blades, piston rings, glass molds, and pump and camera parts.

A copy of the booklet can be obtained by writing to the Advertising Department, Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.

Dust Free

A precision instrument ball-bearing company, needing dust-free air, has an elaborate vacuum tubing system built into its plant, says *Factory*. Janitors, who must pick up dust they cannot even see, plug their vacuum heads and hoses into the system via sockets in floors and walls. Ordinary portable vacuum units, such as household models, cannot be used because they would recirculate part of the dust.

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Aluminum Finds New Patterns of Use

More significant than the record-breaking increase in automotive use of aluminum posted again for 1959, are the new patterns of use it represents, according to a summary by J. Donald Shircliff, regional sales manager for Reynolds Metals Company.

"In the achievement of General Motors alone," he said, "from the aluminum engine for their smallest car to the introduction of leather grained, embossed and anodized aluminum trim panels for their largest city busses, is a potential beyond the rosiest predictions of aluminum progress.

"In both cases, as the largest supplier of aluminum to the auto industry, Reynolds enjoyed the unique position of sole supplier of the molten aluminum for the Chevrolet Corvair engine, as well as the single source for simulated leather aluminum trim for the GMC Truck and Coach Division.

The Aluminum Engine

"The aluminum engine is the logical outcome of the molten concept pioneered by General Motors with Reynolds in 1952," he said, "while the coach application results from a joint engineering program in 1958.

"The success of the Corvair engine underlines our conviction that within three years every major American car manufacturer will have at least one line of aluminum engines," he said, "with four of these expected to appear within the next two years, and three of them scheduled for introduction in 1961."

The Big Three's introduction of compact cars, with at least three and probably four yet to come, he said, dramatizes the auto makers drive to make the most of aluminum's ability to reduce weight and increase efficiency.

He described the compact cars as designed for and born with most of the major aluminum applications developed in the last ten years. He said they represent a take-off point for new and accepted aluminum applications never before seen in the industry.

He cited the Corvair, Falcon and Valiant as having incorporated many of the latest developments in aluminum trim, helping to raise this use to an all time high.

Items used by all three include grilles,

headlamp bezels and instrument-panel overlays.

Each also has its own distinctive elements of aluminum trim from glove-box door trim to taillamp bezels and pillar mouldings.

Much the same is true of functional applications in the compact cars, where common aluminum usages include pistons, oil pumps, carburetor bodies, fuel pumps, generator and starter end plates and power train components.

Each of the new compact cars, he pointed out, brought with them new usages providing additional avenues for aluminum applications for the whole industry. Under this category he listed intake manifolds, oil pumps and steering gear housings.

New Applications

New applications expected to spread most rapidly, he listed as:

—The Corvair camshaft running directly on the machined cast aluminum crankcase, eliminating the need for bearings.

—The Falcon air-cooled transmission, integrating transmission bell housing and case, with the heat dissipating properties of aluminum in this design eliminating the need for a transmission oil cooler.

—The Valiant's revolutionary alternating current generator (alternator), composed of two castings mechanically fastened and eliminating both the steel tube generator case and two end plates.

Chrysler has announced that this new alternator, able to charge batteries at idling speeds, will appear on all Chrysler '61 models.

"But by no means will the pioneering in aluminum be confined to the compact cars," Shircliff said. In outstanding examples of industry firsts in traditional-size cars, he included:

—Corvette's aluminum radiator required for the high performance fuel injection engine with high lift cams. In this use the versatility of aluminum permitted a special design resulting in a more efficient cross-flow radiator.

—Chrysler Corporation's cast aluminum intake manifold standard on all new six-cylinder engines for the Dart, Plymouth and Valiant lines.

—Pontiac's integral wheel and drum combining the function of the superior breaking and heat dissipation of the aluminum drum as pioneered by Buick, with a new and impressive styling flair and offered for the first time by an American producer as optional equipment.

—Horn coils made of aluminum foil laminated with Kraft paper, jointly developed by Reynolds and Sparton Automotive Division, and introduced by the auto industry by Chrysler Corporation.

—Plymouth's foot-high extruded grille combining two extrusions to reduce weight and scrap costs, and resulting in a massive appearance of high style. The extrusion requirements for this grille come from the Reynolds plant at Grand Rapids, Mich.

—Plymouth's new integral glove box door reducing the traditional construction of three pieces to two components by requiring the previously decorative aluminum overlay to serve as a structural member assembled to the inside door panel.

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—Ford's rear quarter applique illustrating aluminum's design flexibility and the ability to be embossed and provide contrast.

—Aluminum windshield-wiper bodies for all cars having electric windshield wipers.

As an illustration of how even the most modern item when designed for aluminum can be improved with manu-

facturing savings, Shircliff noted the Rambler ashtray body redesigned for aluminum extrusions to replace previously stamped, plated and assembled parts. He said this change reduced operation and tooling costs as well as permitting easier and quieter functioning.

Concluding his summary, Shircliff pointed to an average of 24 pounds of aluminum per car in 1954 for an annual

consumption of 132,000,000 pounds, compared to an average of 60 pounds per car for 1960 and an expected industry usage of 460,000,000 pounds of aluminum in the current model year.

"There is every reason to believe," Shircliff said, "that the 600,000,000 pounds of aluminum that we expect the auto industry to use in 1961, will reach at least 1,300,000,000 pounds by 1965."

Project To Pump Niagara Water Uphill

Details of a project to pump the water of Niagara uphill were disclosed on Dec. 1 at an engineering meeting in Atlantic City, New Jersey. Work has already begun on the project, designed to increase the supply of water available to electric generating stations at Niagara Falls.

In a paper scheduled for presentation at the Annual Meeting of The American Society of Mechanical Engineers, two engineers with the Allis Chalmers Manufacturing Company, Milwaukee, Wisconsin, described the equipment that will make the feat possible.

In explaining the purpose of the project, the authors of the paper, F. E. Jaski and W. W. Weltmer, pointed out that a treaty agreement with Canada limits the amount of water that may be diverted from the Niagara Falls and used to turn electric generators. Because of this restriction, and varying demands for power, water available during the evening hours that now goes to waste could be used to meet daytime demands for industrial power.

Engineers, trying to devise a plan to put this water to use, decided to pump it out of the river and into a reservoir eighty-five feet above river level. To do this, they devised reversible pump turbines, that is turbine generator sets that could be run backwards.

Normally, the turbine wheel is spun by water flowing past it, and in turn spins a generator connected to it by a shaft. In the new units now being built, the process can be reversed by feeding spare electric power into the generator and using it as a motor. This in turn spins the turbine backward and causes the turbine to act as a pump, raising water to the reservoir.

As needed, this extra water can be allowed to run back downhill and generate power.

Two new power plants that will bene-

fit by the process are located some five miles from Niagara Falls at Lewiston, New York. The reversible turbine-pump units will be housed in Tuscarora plant. From here the water will flow to the Lewiston Plant at a lower level.

A similar installation will be used by Canadian authorities on the other side of the Niagara River.

The authors estimate that without the pumping operation over two billion cubic feet of water would go to waste during a twelve hour period. This is equivalent to over one million kilowatts of additional power. The reservoir to be filled by the pumping operation will have a capacity of 25,000 acre feet. It is about a mile square in area and about eighty feet deep.

In describing the machinery that will make the pumping operation possible the authors said:

"The intake of the Lewiston and Tuscarora Plants is in the city of Niagara Falls, New York, about 2½ miles above the falls. The water will flow under the city through two tunnels about 46 feet wide by 66 feet high. These are cut-and-cover tunnels about 22,000 feet long made of reinforced concrete.

"The Tuscarora reversible pump-tur-

bines will rank among the largest units of this type ever built. Each pump-turbine is rated to pump 3400 cubic feet per second of water against a dynamic head (water pressure) of 85 feet. The dynamic pumping head will vary between 57 and 99 feet. The pump turbines will run at 112.5 revolutions per minute in a clockwise direction as turbines and counterclockwise for pumping.

"Since there are only a few reversible pump-turbines in operation, the model tests in the laboratory had to be quite complete in determining not only the performance for pumping and turbinning, but such other factors as cavitation, wicket-gate moments, and transient behavior in case of power failure.

Each new installation will add to the general knowledge leading to further improvement of this comparatively new type of prime mover."

Mortar and Pestle

The days of the hand-operated mortar and pestle may be numbered. A new electric mortar and pestle for pulverizing research samples is now in production, reveals *Chemical Week*.

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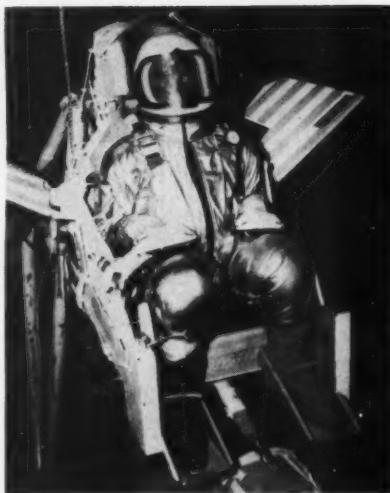
Feel Hemmed In?

You'd think any pilot in this outfit, strapped into the ejection seat of North American Aviation's X-15 rocket plane, would feel that way too. Actually, the X-15 pilot, simulated by a dummy in photo, is equipped with a form-fitting flying suit which in effect is a miniature pressurized cabin tailored to his individual measurements.

Moreover, the fins jutting out from the upper right and left sides of his ejection seat assure that he'll "straighten up and fly right" should he have to pull the emergency lever and be shot out of the plane.

The fins, made from aluminum honeycomb, are a new innovation which may well save the lives of many jet pilots. Before their use, uncontrolled tumbling through the air after ejection from a crippled plane could cause serious injury and, in many cases, death.

The fins stabilize the pilot's flight before his chute opens. In effect, he is safely lodged in another, smaller plane.



The honeycomb fins, whose importance engineers say "can't be overemphasized," are made by Hexcel Products, Inc., Berkeley, California.

Time to Look at Your Mail Box

With a memory that the busy Christmas Season has just passed and that the average U. S. family receives some 80 pounds of mail each year, much of it containing important correspondence which affects the success of both business and social life, Chicago Postmaster Carl A. Schroeder says that it's time to take a second look at your mail box.

If a container into which carriers put people's mail were related in looks to the safety, adequacy and otherwise to the value of their contents, only first-quality receptacles would be used,

Schroeder said, but unfortunately many people instead employ cigar boxes, oil cans, cheese boxes, coffee tins and other unlikely substitutes.

Inspect your mailbox, Postmaster Schroeder says, checking it for four things: adequacy of size, design and repair; visibility and accessibility; provision for locking if in an apartment house or otherwise unprotected; and, very important, properly identified not only as a mail box, but in cases where it may be doubtful that it is your mail box.

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ISA Announces Transducer Project

John Johnston, Jr., president of Instrument Society of America announced details recently of a major project of vital importance to every segment of instrumentation—the compilation and publication of specific information on thousands of transducers used in modern instrumentation. Working through the ISA Primary Elements Committee, a special Transducer Committee will assemble, classify, collate, edit, and publish a comprehensive compendium of up-to-date information on all known transducers used in industry, medicine, biology, military applications, etc. This program will embrace all transducers described in the literature and those commercially available, both foreign and domestic. A bibliography of source material and a listing of manufacturers of transducers will be kept continuously up-to-date and periodic publication of revised editions is planned. This information will eventually be entered into information retrieval systems to facilitate rapid determination as to the availability of a transducer having specific characteristics.

Transducer Growth

The growth of the application of transducers is one of the most phenomenal aspects of modern instrumentation. A transducer is defined as any device which enables the conversion of any physical, chemical or biological phenomenon into an electrical, hydraulic, pneumatic, mechanical, optical and other signal for transmission, recording, measurement, analysis, actuation, output or control. Transducers have been referred to as pick-ups, sensing elements, primary elements, command devices, sensors, detectors and probes. As examples, transducers exist which convert pressure, temperature, acceleration, force, mass, time, distance, radiation and a multiplicity of other phenomena into electrical form. These signals are then readily fed to amplifiers, data processing systems or output controllers. Many instrumentation problems may be resolved into the choice of input and output transducers with an interconnecting information processing link. Transducers extend, refine, supplement, or replace man's senses in remote and hazardous locations where man himself

cannot exist or survive, such as nuclear reactors and outer space.

The number and applications of transducers are increasing at a rate beyond the capacity of any individual to be familiar with all these even in specialized fields such as, for example, modern air conditioning or indoor climatic control. Information on transducer capabilities and performances appears in a wide variety of scientific and technical journals, trade publications and commercial advertisements. The lack of ready availability of this information to the scientific investigator, researcher, engineer and designer has tended to slow the pace of technical progress in a number

of fields and frequently time has been wasted in the design of a new transducer already available in another field. The Instrument Society of America has long been aware of this problem and for the past two years its Primary Elements Committee, under the chairmanship of M. E. Stickney of Beckman Instruments, has been planning a comprehensive attack upon it.

Compilation and publication of the first volume is expected in January, 1961. The basic source materials will be kept current by periodic checking with both the original and new sources of data. Periodic publication of revised editions is planned. It is expected that

use of retrieval systems for this vast amount of information would save untold hours of design and research time in government, science and industry. The first aspect of publishing the compilation is being financed by the Instrument Society of America.

The Committee invites both manufacturers and users of transducers to submit information and devices used or made by their organizations to Transducer Committee, Instrument Society of America, 313 Sixth Ave., Pittsburgh, Pa.

Coordination of this project, including editorial and production activities, is under the direction of Charles W. Covey, Editor of *ISA Journal*.

New "Family of Alloy Steels" Confirmed

The International Nickel Company, Inc., has confirmed reports in the trade that a remarkable new family of very high strength nickel alloy steels has been invented in the Research Laboratories of the company.

Nominally identified as 25 per cent nickel steels, these new alloys achieve unique properties by simply air cooling from the heat treating temperatures. Yield strengths in excess of 250,000 psi with 6 to 10 per cent elongation and above 20 per cent reduction of area are obtainable in section thicknesses where such high strength properties were not heretofore attained. In some cases yield strengths in excess of 290,000 psi have been achieved. Maximum hardness in excess of 67 Rockwell C has been obtained.

Many of these new steels also possess excellent cold forming characteristics after a simple annealing treatment which consists merely of air cooling from solution temperature. In this condition, they have a yield strength of the order of mild steel.

The fact that the high strength properties are obtained without liquid quenching means that intricate parts can be fabricated to close tolerances while the steel is in its soft annealed condition and can be hardened to these high strength levels without appreciable distortion. This factor together with the high order of mechanical properties attainable should make the 25 per cent nickel steels of particular interest for applications in aircraft and missiles and for high strength wear resisting precision parts such as bearings.

Another unusual feature of the 25 per cent nickel steels is that they are weldable in the hardened condition without pre-heat. This feature together with the extremely high strength properties which are not limited to thin sections, is expected to lead to important applications such as in heavy wall pressure vessels and in heavy defense equipment.

The 25 per cent nickel steels are readily hot worked and can be produced in all the various commercial shapes, such as bars, plate, sheet, tubing, etc. While not yet commercially available, it is expected that ultimately they will be produced by a number of steel producers.

Although the combination of mechanical properties is affected by varying the nickel content from as high as 30 per cent down to 20 per cent or lower, with suitable additions of titanium and aluminum, the optimum combination of strength and ductility appears to be at about 25 per cent nickel, with 2 to 6

per cent titanium and/or aluminum, carbon held as low as possible and preferably below 0.05 per cent, silicon and manganese normal, and the balance iron.

This family of new steels, which is covered by a U.S. patent application of Inco, was invented by C. G. Bieber, research metallurgist of the Inco Research Laboratories. The patent application indicates that the inclusion of aluminum and titanium in the range cited makes the steels responsive to both precipitation and martensitic hardening. By a combination of these hardening mechanisms in proper sequence and through appropriate control of time and temperature during heat treatment, the properties can be controlled over a broad range.

Knowledge

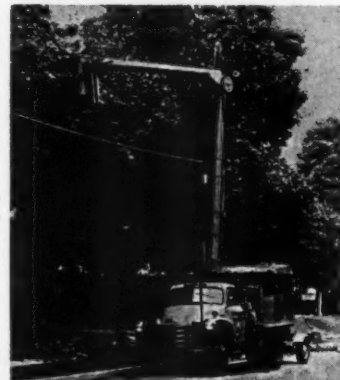
As for me, all I know is that I know nothing.
—Socrates

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Great Promise in Rubber Research

Automobile tires that need no air, simple rocket engines that need no expensive valves or tanks, and smaller "humps" under the floor of cars: these are some of the improvements promised by research in the rubber and plastics industry during the past few years. The conclusions were contained in a paper scheduled for presentation on Nov. 30 at the Annual Meeting of The American Society of Mechanical Engineers in Atlantic City.

The author of the paper is Leora E. Straka, research librarian for the Good-year Tire and Rubber Company.

Airless tires would be achieved by filling the space inside the tire with a special urethane foam, somewhat similar to the spongy material used as "crash panelling" on some automobile dashboards. There is no immediate prospect, however, of commercial production of such tires.

Other Items Cited

Other items cited in the paper, titled "Rubber Developments, June 1957 - June 1959" were: For automobile drive shafts, another form of urethane, can be used to join the front and back portions of the shaft. "This permits a much smaller drive shaft coupling and could lead to smaller drive shaft humps in cars of the future."

On the supply and demand front, the paper notes: "Economic as well as scientific reasons have stimulated interest in finding a satisfactory substitute for natural rubber. Until the present time only natural rubber has been satisfactory for heavy-duty tires for trucks, buses, and airplanes where heat build-up is a major factor. Then too, in addition to the fact that a world-wide shortage of tree rubber has been forecast for 1960, every effort is being made to attain independence of imported rubber in the interests of national defense. . . .

"Research and development investigations on polyisoprene rubber has also been proceeding in Russia. First news of the Russian synthesis of natural rubber appeared in 1957. Since that time a number of Russian technical publications have appeared covering the properties and test data of their 'SKI' polyisoprene rubber. Their general conclusions are that the closeness of structure of

'SKI' and natural rubber accounts for the large degree of agreement in their mechanical properties. However, they state that since these rubbers are not identical there are certain differences in their properties; in some properties 'SKI' will be inferior to natural rubber while in others it will be equivalent or its superior."

Aircraft Tires

As to aircraft tires capable of absorbing the enormous shocks of high speed landings: "High speed jet aircraft tires made entirely with polyisoprene rubber and capable of withstanding landing speeds up to 250 miles per hour have passed rigid durability tests that qualify the man-made rubber for jet aircraft service. These tires also successfully withstand temperatures in excess of 250° F. This is an almost instantaneous heat build-up generated by high speed landings.

"A wire brush-like tire, containing no rubber, no fabric, and needing no inflation, is capable of withstanding temperatures from 1000° F. to 2000° F. that might be encountered by a space craft reentering the earth's atmosphere. The tire which has twisted wire treads that look like a wire polishing wheel, weighs about 40 lbs. The wire tire has a number of advantages over the simple skid pads that are used on some recoverable missiles. It absorbs runway irregularities better, doesn't get so hot, and gives much better directional and braking control.

Wire Cord Tires

"Although wire cord tires are not new, new construction techniques have made possible cooler running aircraft, truck, and bus tires that give up to 100% more mileage on the original treads. The new tires have wire reinforced walls and three plies of fine wire mesh under the tread instead of the previous single ply tread. It is this reinforcement under the tread that results in minimum friction between the road surface and the tread, and consequently greatly improved wearability. The tires have been commercially available since July 1957.

"The development of a satisfactory adhesive for Dacron and rubber has

resulted in building tires with Dacron cord. It has been reported that tires built of these materials give increased mileage and an improved ride. There has been no indication when Dacron tires will be available commercially."

A special group of synthetic rubbers, known as "adduct" rubbers have inspired a special application. "A proposed application of adduct rubber has been in the construction of a giant blimp which may be the first nuclear aircraft. Dacron cloth coated with adduct rubber would cover the 4.5 million cubic foot body of the airship. The material can withstand 100,000,000 roentgens of radiation and has aging and diffusion characteristics equal to those of present coatings.

"In June (1959) a new rubber-based material was announced for use in atomic powered planes and other vehicles which can shield the crew and passengers from neutron radiation. The new rubber will take over the job that is normally handled by heavy concrete

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and water shields in stationary atomic plants. In the power units for planes, lead shields still will be required to absorb the deadly gamma rays. Preliminary tests show the rubber will withstand at least 100 million roentgens of radiation with no apparent deterioration."

For rockets, great promise is held out by solid fuels that permit cheaper simpler engines. These have been made possible by synthetic rubbers which themselves burn, adding to the full supply, and which can be mixed with higher energy fuels while in a liquid state then poured into rocket engines and cooled.

Study at Night

A total of 298 engineers, employed by 24 St. Louis firms, are seeking advanced engineering degrees at night at the Institute of Technology of St. Louis University, it was announced Nov. 30 by Gerald E. Dreifke, director of the University's graduate engineering program.

The engineers are enrolled in a five-year program leading to a master's degree. Most are studying electrical engineering, with emphasis on servomechanisms and automation. They possess undergraduate degrees from 61 different colleges and universities.

"The interest in the program is indicative of the seriousness of purpose on the part of a lot of engineers," Dreifke said. "While they could be sitting in an easy chair watching television, they are sitting in a classroom, determined to keep up with the rapid advancements in their field."

Inland and Allied Steel Talk

Inland Steel Company and Allied Structural Steel Companies have announced that their officers have been discussing the acquisition by Inland of the business of Allied. The acquisition would be subject to standard legal and other considerations as well as to approval by the respective board of directors.

Allied Structural Steel Companies operate structural steel fabricating

plants in Hammond, Indiana; Chicago, Illinois; Clinton, Iowa; and Knoxville, Tennessee.

River-Line Lights

Neon lights are being spaced on transmission-line spans across rivers to alert airplane pilots who often follow rivers when fog cuts visibility, reveals *Electrical World*.

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Longest Cross-Country Belt System

The world's longest permanent cross-country belt conveyor system got into operation officially on Nov. 11, 1959.

Ideal Cement Company's new 5½ mile belt conveyor system which carries 1,000 tons of crushed limestone per hour from its Lawrence, Okla. quarry to its cement mill at Ada, was dedicated by Cris Dobbins, president of Ideal, during the company's open house celebration for the new \$20 million Ada cement plant.

Ideal is one of the largest cement producers in the United States and its new all-weather conveyor system is the first major conveyor ever supported by prestressed concrete structures.

The new conveyor was engineered, fabricated, and erected by Link-Belt Company and consists of seven separate belt conveyors arranged consecutively to feed on to each other. In its cross-country course, the system changes direction four times, and from the air, looks like a giant letter "S" as it winds through the rolling Oklahoma countryside.

Crosses Two Highways

The conveyor crosses two highways and the Frisco and Santa Fe railroads, and provision has been made at numerous points for passage of cattle and farm equipment over the conveyor, since the right-of-way is across farm land for the most part.

The longest conveyor, almost two and a quarter miles in length, is the longest single flight ever built. It required an endless rubber belt 4½ miles long. Although it travels at the rate of 500 feet a minute, this belt makes only ten round trips during an eight-hour day. By contrast, the shortest flight is 550 feet long.

The conveyor carries crushed limestone four days a week and shale on one day. The limestone is crushed to ¾-inch size in a crushing plant at the quarry end of the system, while the shale bypasses the secondary crushers and proceeds directly over the 5½-mile conveyor system. The conveyor system operates eight hours daily, five days a week.

A single push button puts the entire 5½-mile system in operation. When the "start" button is pressed, the belt conveyor closest to the mill, the discharge end, starts immediately, and after its tail



This view shows a portion of the all-weather conveyor system, which, like a concrete ribbon, crosses the Oklahoma countryside.



The world's longest permanent cross-country transport belt conveyor system, 5½ miles in length. This aerial view shows a portion of the all-weather conveyor system, which, like a concrete ribbon crosses highways and railroads as it winds through the wooded, rolling Oklahoma countryside. It carries 1,000 tons an hour of limestone or shale from a quarry at Lawrence to Ideal Cement's new cement plant in Ada, Okla. The longest individual conveyor is 2¼ miles long, longest single flight ever built. The conveying system was designed, fabricated and erected by Link-Belt Company.

pulley has reached about 50 per cent of normal operating speed, a relay starts the next conveyor in line. This in turn starts the one ahead of it, and so on until the first conveyor at the quarry end is running at full speed. This starting sequence takes about five minutes when the system is fully loaded.

Due to its length and capacity, and its importance to the operation of the cement mill, elaborate steps have been taken to insure adequate power to start the belts under every conceivable condition of loading and to control the tremendous inertial forces which would be released in the event of power failure.

Since a power failure would stop all motors simultaneously, provision has been made to have the conveyors have a longer coasting time progressively from the quarry to the mill. This was

done either by dynamic braking to shorten time of coast down or by providing inertia in the form of fly wheels to extend the time of coast down. Safety devices include latest techniques for interlocking and automatic control.

In a radical departure from steel-supported conveyors, the belts are supported by precast, prestressed concrete channel stringers spanning 50 feet. In addition to supporting the conveyors, the stringers form a cover over the top of the belt. One side of the conveyor is curtailed by a continuous corrugated aluminum wind guard. The stringers rest on precast reinforced concrete U-stands.

Prestressed Girders

Where the conveyor is raised to clear highways and railroads, the U-stands are mounted on the top flanges of pre-

stressed concrete girders or on elevated piers. Where spans exceed 50 feet, the conveyors are mounted on the girders, and their flanges are made sufficiently wide to serve as walk-ways.

In the entire final conveyor, which is elevated to cross the main line of the Frisco Railroad, the conveyor stringers are carried on a series of 97-foot prestressed concrete girders which rest on four-legged towers about 30 feet high.

The entire system is on a right-of-way strip which averages 100 feet in width, fenced on both sides throughout its entire length. This right-of-way contains a 40-foot wide earth roadbed with its drainage structures, an electrical power transmission line from mill to quarry, the belt conveyor structures and a 16-foot wide stone-surfaced road for inspection and vehicle access.

Giant Balloon Is Construction Boon

A giant balloon has given a new boost to winter season construction, reported a plastics expert in Atlantic City, N.J., on Nov. 30, also noting that this is only one important development in the booming plastics film field.

The balloon, made of polyethylene film, is spread over the construction site and supported with air from a low pressure fan, said T. E. Werkema, industrial research analyst, Dow Chemical Company, Midland, Mich. The translucent film keeps the materials and the workmen from freezing and provides the men with plenty of light to work by. Polyethylene is low cost and easy to handle, too he said. In fact, semi-permanent air-supported structures have been built with this film, added Mr. Werkema. He spoke at the Annual Meeting of The American Society of Mechanical Engineers.

Polyethylene is also used by farmers in a wide variety of applications, continued Werkema. Silage, which would ordinarily spoil to a depth of up to 24 inches in one year without protection, lasts throughout the winter covered with polyethylene film. And, in the frosts which swept California's Imperial Valley a year ago, the only field where plants survived was one covered with this film.

Polyethylene is also being used to fumigate the soil to kill insects, an idea which, if developed, could save close to a billion dollars in crop damage costs per ear. Strips of the film are tacked down to the ground and the fumigating chemical placed beneath them.

For Decorative Interiors

Another new development, continued Werkema, is the use of polyester film as a decorative interior in houses. The film is laminated onto a paper with the desired design or color and applied as wall paper. It washes well, and does not scratch or puncture easily. PVC (polyvinyl chloride) can also be used in this way, with the added advantage of being fire resistant.

Polyethylene finds use in houses as a covering agent. It prevents moisture from moving from the ground into a building and alleviates the usual rotting and musty odor.

At the same session, Lois W. Brock, of the Research Laboratory of General Tire and Rubber Company, Akron, Ohio, listed further uses for raw plastics.

"Orkot," a new material used in bearings, has given startling results, she said; it has lower friction and greater resistance to wear than material now

employed, and can be lubricated with water.

Other plastics, some new, some now finding extensive development, are being used in life preservers, cameras, aircraft and submarine instruments, cones for space age missiles, autos, brake linings and piping.

Man Behind the Man

To handle one squadron of Thor missiles (15 launching emplacements) requires ten miles of piping, 2,500 miles of wire, 1,500 meters, 3,000 panel light assemblies, 50,000 resistors and potentiometers, 50,000 capacitors, 5,000 relays and enough electricity at peak output to supply a community of 25,000 homes, reveals *American Machinist*.

All Things Change

Watchmen's nightsticks have gone electronic, reports *Factory*. A new model has a built-in transmitter that actuates an electronic alarm system. A button at the top of the stick sets off a signal, enabling a watchman to sound alarm instantly without going to a fixed box. The signal can be used to operate any burglar alarm or other device.

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POSITIONS AVAILABLE

C-7798 INSIDE SALES TRAINEE Grad. ME or Chem. Engr. age to 30; 0-5 yrs. exper. in engrg. or sales. Duties: Sales trainee—handling tech. correspondence, prepare sales bulletins, etc. on heat exchangers. After training in office for abt. 2 yrs. will be assigned to field sales engrg. contacting OEM accounts. Must have good sales personality sal. \$6600/8400 dep. on exper. loc. So. Wis., employer will negotiate the fee.

C-7803 ASST. PLANT ENGR. BS in engrg. or equiv. age 35-45; 5 yrs. exper. supv. of plant maint., operation of boilers & utilities & machine tool repair & maint. know preventive maint. programs. Duties: General supv. of maint. dept. in 2 plants; preventive maint.; planning & scheduling of major repairs on machinery, eqpt., bldgs., & material handling eqpt. for a mfr. of motorcycles, sal. \$650/750 loc. Wis., employer will pay the fee.

C-7812 (C) RESEARCH & DEVEL. ENGRS. MECH. & CIVIL: MS & PhD, 0 to considerable exper. in one of the

following: experimental stress analysis; soils dynamics to work on research programs in the areas of wave propagation in soils, soils properties & soils structures; experimental hydrodynamics; analytical mechanisms & stress analysis; thrust on rockets, ballistics & case design; rocket technology, aerodynamic htg.; thermal radiation, heat transfer in reactor design & solar energy for a research organization sal. \$6600/10,800 loc. Ill. employer will negotiate the fee.

C-7813 SOILS & FOUNDATION ENGR. Grad. CE 5+ yrs. exper. in foundation work. Duties: To act as consultant advising prospective builders what wood piling will do & more specifically what it will do in soil conditions at the location of a proposed structure. Must have wide knowl. of soil characteristics & long exper. in making test borings. Good promotional personality, considerable travel, sal. abt. \$12,000 loc. Ill., employer might negotiate the fee.

C-7825 SR. PROJECT ENGR. EE or ME or elect. & indust. engrg. back-

ground; age 30-42; at least 5-10 yrs. exper. in supv. of petro-chem. or chem. plant design, installations, & eqpt. changes. Familiar with prevention maint. programs, project cost control, plant elect. design & materials handling eqpt. sal. to \$8,000 dep. on exper. loc. Midwest, company pays placement fee.

C-7829 (A) CHIEF ENGR. Grad. ME or EE several yrs. exper. in directing design & devel. dept. of small company mfg. complex electro-mech. industrial eqpt. Should have good understanding of mfg. shop practices & eqpt. installation & service problems. Should have good judgment of product devel. & an understanding of the economic & mfg. problems of several fields such as packaging, drying or materials handling where complex elect. mach. & hydraulic controls are used. Duties: Will direct a small group of creative practical designers & engrs. in devel. a new line of products & working out the details of devel. under way. Good potential for a mfr. of textile mach'y. & eqpt. sal. to \$12,000 loc. 60 miles from Chgo. employer will pay the fee.

C-7831 (A) SR. PROJECT ENGR. EE or Physics Grad. age to 45; 7 yrs. exper. know TV & receiver design. Duties: Resp. for putting into production a transistorized TV receiver. Supv. several jr. assigned engrg. personnel sal. \$12,000 loc. Chgo. employer will pay the fee (B) SR. RESEARCH ENGR. BSEE or Physics age 23-45; 4 yrs. exper., know research design, pulse circuits. Duties: Devel. various forms of wireless remote control, cost reduced vacuum circuitry, investigation of various novel designs of communications

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1005-MW: PLANT SUPT. BS MET. ENG. 37; 3 yrs. melting & fabricating alum. 10 yrs. open hearth & electric basic steel making both in mills & foundry. Exper. in casting & forging of ingots up to 30 ton. Also research & complaint investigations.

1016-MW: SUPV. ENGR. BSEE 40; Design & application elect. eqpt. 7 yrs. large elect. mfr. Several patents. 10 yrs. supv. exper. central staff large chem. company plus 3 yrs. line supv. engrg. & maint. Group.

1019-MW: CHIEF STRUCTURAL

ENGR. MSCE 33; 10 yrs. exper. in soil mechanics & foundation engrg., design & layout of heavy indust. & process plant structures. 3 yrs. as Chief Struct. Engr. supv. 10-25 engrs. & draftsmen; estimating engrg. & construction costs. Reg. Prof. Struct. Engr. Ill., Ind. & Ohio.—Chgo. Metro. Area.

1031-MW: MECH. ENGR. BSME-MBA-6/'60 32; Desires smaller organization where exper. & training will be of value. 2 yrs. machine shop, 6 yrs. project engr. & research design devel. installation operation-food processing eqpt.

for a mfr. sal. to \$10,000 loc. Chgo., employer will pay the fee.

C-7841 MANAGER DEVEL. & RESEARCH Grad. Metallurgical Engr. age to 50; 5+ yrs. exper. in supervisory work in brass, bronze, cast iron & possibly steel foundry. Should have processing exper. in a foundry. Knowl. of machining problems relative to specific metals. Familiarity with administrative & tech. aspects of research & devel., metallurgy & process control, sales engrg. & quality control. Will be resp. for staff of 9 engr. Should be willing to live in a small town, sal. \$12,000+ bonus, loc. Ohio.

C-7844 PUMP DESIGNERS Grad. ME 2+ yrs. exper. in design & devel. work. Duties: Design of Impellers & large centrifugal pumps. Can use men from 2 to 10 yrs. exper. for a mfr. sal. \$6600/9600 dep. on exper. loc. Wis. employer will pay the fee.

C-7847 PROJECT ENGR. Grad. ME, Chem. E. or Struct. E. age 35-45; 8+ yrs. exper. in layout, design & construction of cement plants. Duties: Must be able to be prime motivator from early stages of planning thru final design & construction of a cement plant. Client contact & promotional activities will be an important phase of applicant's duties for a consultant sal. \$10/11,000 loc. Chgo. Hdqrs. employer will pay the fee.

Ore Roasting Plant To Be Erected

Leonard Construction Company of Chicago has announced receiving the contract award for engineering and construction of an ore roasting and sulfuric acid plant installation on a new Canadian plant site at Port Maitland, Ontario, for Sherbrooke Metallurgical Co. Ltd., a subsidiary of Matthiessen & Hegeler Zinc Co. of LaSalle, Ill.

The ore roasting plant will utilize Canadian zinc ores and will include the first commercial installation in Canada of a newly developed type of fluidized roaster.

The contact sulfuric acid plant will utilize both the gases from the ore roasting plant and from burning of elemental sulfur.

Surplus heat in both the roaster and acid plant installations will be recovered as by-product steam for utilization in other parts of the operation.



In accordance with Article 1, Section 5 of the By-Laws of the Western Society of Engineers, there is published below a list of applicants for admission received since the last issue of the MIDWEST ENGINEER magazine.

Donald B. Sweely, Department Chief, Western Electric Co., Inc., Hawthorne Station.

John A. Ruzzier, 806 S. Oakley Blvd., attending Chicago Technical College.
Warner S. Schatz, Sales Engineer, Hammerrills, Inc., 141 W. Jackson Blvd.
Donald P. Bartolo, Sales Engineer, Allis-Chalmers Manufacturing Co., 135 S. LaSalle St.

Thomas E. Hitzeman, Sales Engineer, Allis-Chalmers Manufacturing Co., 135 S. LaSalle St.

Clyde S. Benson, Party Chief, E. N. Fletcher, 1426 Miner St., Des Plaines, Ill.

J. R. Shields, Project Engineer, Illinois Bell Telephone Co., 208 W. Washington St.

Martin D. Gentry, Safety Engineer, Henry Pratt Co., 319 W. Van Buren St.

Maurice W. Lane, Superintendent, Western Electric Co., Inc., Hawthorne Station.

W. Vavrik, Field Engineer 'B,' Northern Illinois Gas Co., 615 Eastern Av., Bellwood, Ill.

Miles Devine, Mechanical Engineer, Sargent & Lundy, 140 S. Dearborn St.

G. P. Stuckum, Engineer, Western Electric Co., Inc., Hawthorne Station.

Babcock & Wilcox Gets Contract

The Babcock & Wilcox Company has reported the receipt of a contract for more than \$6-million to manufacture and install a Cyclone furnace fired radiant boiler to serve the second turbine-generator unit in the Baltimore Gas and Electric Company's new Charles P. Crane Station, near Chase, Md. The first unit, now under construction, is expected to begin operating about mid-1961.

Designed for a pressure of 2775 pounds per square inch and to operate at a pressure of 2475 pounds per square inch at the superheater outlet, the boiler will supply 1,360,000 pounds of steam per hour to the throttle of a nominally rated 183,000 kilowatt turbine at a pressure of 2400 pounds per square inch and a temperature of 1050 degrees Fahrenheit, and will reheat the steam to 1000 degrees F.

The unit will be equipped with four Babcock & Wilcox Cyclone furnaces. These will develop a heat input of 1,741,000,000 BTU's per hour while burning 129,000 pounds of bituminous coal from Pennsylvania and West Virginia. (A British Thermal Unit, known commonly as a BTU, is the amount of heat required to raise the temperature of one pound of water one degree F.) A semi-outdoor installation, this second

boiler is scheduled to go on-line early in 1963.

Developed by Babcock & Wilcox, the Cyclone furnace employs primarily a surface-burning method of combustion that represents a departure from previously accepted methods. Coal is crushed, not pulverized, to pass through a No. 4 mesh screen, and is blown tangentially into the Cyclone furnace. A thin coating of slag forms quickly on the inner circumference of the furnace, and the larger coal particles, adhering to the slag coating, are burned rapidly as the whirling air sweeps over them at a velocity of approximately 200 miles per hour.

Above Fusion Temperature

During operation, temperatures in the Cyclone furnace are substantially above the ash fusion temperature. As a result, the melted coal ash remains fluid. It drains continuously through a tap hole, flows into the bottom of the boiler furnace and then passes as melted slag into a water cooled tank for quenching into solid fragmented slag and easy disposal.

Because of its design and ease of operation, the Cyclone furnace does not require pulverizing apparatus and can be readily arranged without induced draft fans, which represents a saving to

Baltimore Gas and Electric Company both in initial and over-all maintenance expenditures. The coal preparation, feeding and burning equipment that is used is of simple construction and needs a minimum of care.

Capacity, 1,471,500 K.W.

When the second unit enters commer-

cial service, it will increase Baltimore Gas and Electric Company's total steam-electric generating capacity to 1,471,500 kilowatts. The utility serves a population of approximately 1,800,000 people in a 2,283-square mile area, which includes the highly industrialized City of Baltimore, and the surrounding territory extending from the Pennsylvania state line

to a point 50 miles below Baltimore, and from Chesapeake Bay on the east to points near the District of Columbia.

Named for Baltimore Gas and Electric Company's present chairman of the board, the Charles P. Crane Station is located about nine miles east of Baltimore on a tributary of the Chesapeake Bay.

Case Institute Breaks 80 Year Tradition

Breaking a tradition of eighty years, Case Institute of Technology for the first time in its history will encourage outstanding women to enroll as undergraduate students at Case. Kent H. Smith, Acting President of Case made the announcement.

"We are making this announcement in response to a demonstrated national need," Dr. John A. Hrones, vice-president for Academic Affairs said in explaining the change in Case policy. "The need for college graduates in engineering science and management is growing ever greater.

"We cannot turn our back..."

"We cannot turn our back upon the great reservoir of potential talent that is available in bright young women graduates from high schools. It is a great pleasure for us to give them an opportunity to embark in these professional fields. For the foreseeable future America will need the educated talents of all its citizens."

David Owen, director of admissions at Case, in commenting on the significant change in policy said, "In traveling throughout the country discussing higher education with students who are interested in science, engineering, and management, I have been frequently impressed by the number of highly qualified women who hoped for careers in these fields. Case is performing a genuine service in enlarging its student body to include those women with outstanding records in high school."

The first women undergraduates will be admitted to Case in the fall of 1960. Due to lack of dormitory facilities, only those outstanding women candidates who will live at home or with relatives in the greater Cleveland area and can commute to the campus will be considered. Beginning in 1961, however, highly qualified women candidates from any area will be accepted depending

upon the availability of approved living accommodations in the University Circle area.

Although Case's policy has been against the acceptance of women as undergraduate students, women are admitted to graduate work at Case, and two are enrolled in the graduate school.

During the war and following, a few exceptions to the rule of excluding women from the undergraduate school were made. Up to 1953, five undergra-

duate degrees were awarded to women. Since that time, only one woman undergraduate has been admitted to Case, Marianne Lukocs. She was a student who came to the United States following the Hungarian Revolution. A special exception was made in her case because of the excellent quality of her preparation which required only a semester and a half study on the Case campus before she received a bachelor's degree in Mechanical Engineering.

Bruning Co. Has New Division

Paragon-Revolute Corporation, Rochester, New York, manufacturer of blueprinting and allied reproduction equipment, has become a division of the Charles Bruning Company, Inc., Mount Prospect, Illinois, it has been announced by Herbert Bruning, president. The transaction was completed through an exchange of Bruning stock for assets of the other company, Mr. Bruning explained. Bruning distributes a complete line of engineering and drafting equipment and manufactures Copyflex copying machines and papers.

L. Gordon Booth, Paragon-Revolute president, remains as general manager of the new Bruning division and will

become a vice president and member of the Bruning Board of Directors. Paragon-Revolute's Canadian subsidiary, Paragon-Revolute (Canada) Ltd., will continue operations without change.

H. H. Sullivan and W. L. Sullivan, Paragon-Revolute founders, will serve the new division as consultants. The division will continue to market the Revolute line of reproduction equipment.

Good Omen

April 15 or Income Tax Day, 1960, comes on Good Friday.

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WSE Nominating Committee Set

To the Corporate Members:

I am pleased to announce that in accordance with Article X, Section 3, of the Constitution, the Board of Direction has appointed a Nominating Committee as follows:

Ormas G. Smith (Board Member)
Merlin J. Adams
W. M. Ballenger
Richard N. Bergstrom
Herbert C. Hoff
George Krambles
Marvin V. Maxwell

The Constitution also provides that suggestions for nominees shall be solicited in the publications of the Society.

FRED R. BRUCE
Executive Secretary

Tear Out and Return

To the Nominating Committee:
Western Society of Engineers:

I suggest the following names for consideration by your committee for offices indicated.

Officers and Trustees

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1st Vice Pres.
2nd Vice Pres.
Treasurer
Trustee (eight to be nominated)

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or at present a member
or the Board or candi-
date thereof
Signed
Address
Date

Calendar of Chicago Engineering

Jan. 13, Wed., WSE Noon Luncheon Meeting, 12:00 noon, WSE Hq.

Jan. 14, Thurs., WSE Speaker and Paper Group, 12:00 noon, WSE Hq.

Jan. 19, Tues., WSE General Meeting, WSE Hq.

Jan. 20, Wed., WSE Noon Luncheon Meeting, 12:00 noon, WSE Hq.

Jan. 20, Wed., WSE Civic Committee Meeting. Dinner 6:15 p.m., WSE Hq.

Jan. 20, Wed., AIEE Conference on Flat Rolled Products. Del Prado Hotel.

Jan. 21, Thurs., WSE Speaker and Paper Group, 12:00 noon, WSE Hq.

Jan. 27, Wed., ASME noon luncheon meeting, WSE Hq.

Feb. 1-5, Mon.-Fri., ASTE Committee Week. Hotel Sherman.

Feb. 3, Wed., WSE Noon Luncheon Meeting, 12:00 noon, WSE Hq.

Feb. 3-4, Wed.-Thurs., Midwest Welding Conference, Illinois Institute of Technology Chemistry Bldg., 3255 S. Dearborn St.

Feb. 4, Thurs., WSE Speaker and Paper Group, 12:00 noon, WSE Hq.

Feb. 10, Wed., WSE Noon Luncheon Meeting, 12:00 noon, WSE Hq.

Feb. 11, Thurs., WSE Speaker and Paper Group, 12:00 noon, WSE Hq.

Summer Department

A New York firm has developed a valve for aerosol cans that only dispenses in the right direction, says *Chemical Week*. Accidental side pressure on the pushbutton that might direct the spray at the user will not open the can's valve.

Keeping state highways green is an expensive proposition for most states, reports *Engineering News-Record*. New Jersey's bill for keeping the lawns and trees trim on the Garden State Parkway has been \$7.7 million for the past seven years.

MIDWEST ENGINEER

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Gus Berthold	17	A. A. Lipsey & Associates	22
John Burns Construction Co.	14	W. H. Lyman Construction Co.	6
Christie Electric Corp.	12	Robert S. Mayo	*
Chas. W. Cole & Son	22	Midwest Forestry Corp.	20
Combustion Engineering	*	Alfred Mossner Co.	23
Commonwealth Edison Company	*	Muncie Construction Co.	16
Consoer, Townsend & Associates	22	Nash Brothers Construction Co.	4
Contracting & Material Co.	9	National Survey Service	*
DeLeuw, Cather & Co.	24	Fred Nelson of Dayton, Ohio	*
Delta Star	*	Northern Illinois Gas Co.	*
Duncan Electric Co.	18	Pacific Flush Tank	*
Edward's Pole & Construction Co. ...	*	Portland Cement Association ..	Cover IV
Federal Pipe & Supply Co.	8	Sargent & Lundy	22
Walter H. Flood	24	Sauerman Bros., Inc.	*
General Electric	*	Wm. E. Schweitzer & Co.	19
Gilbert & Hodgman, Inc.	*	Soiltest, Inc.	*
Greeley & Hansen	22	Soil Testing Services	24
E. F. Gritschke & Associates, Inc. ...	24	Stanley Engineering Co.	22
The Haines Co.	*	L. L. Weldy & Associates	29
Hazelet & Erdal	22	Westinghouse	*
		Edward J. Wolff	4

Companies marked with an asterisk () appeared in a previous issue.

CROLF

GOLF ON A BUDGET

By Howard A. Carter

Crolf is a game played in the open and is much like golf. A resilient ball is driven from a mound (tee) and repeatedly struck by a club into a series of holes. The player requiring the fewest strokes to drive the ball into eighteen different holes one after the other wins the game. Orthographically, the name is comprised of the first two letters of croquet and the last three letters of golf; hence, this makes crolf two-fifths croquet and three-fifths golf. However, as played it is mostly golf. The crolf club is reminiscent of a croquet mallet but here the similarity ends.

Crolf is played on a pasture-like terrain and no effort is made to cultivate a grassplot beyond cutting the sward with a farmer's hay mower. The "green" that is the area around the holes, is of bare hard ground. The driving mound is a pile of earth large enough for the player to stand on and swing the club. The rough is uncut grass and weeds or the trees in a forest and the undergrowth. There are natural and artificial hazards irregularly interposed on the "fairways."

France claims the origin of croquet (Roque) and the game seems to have been played in 1700 and perhaps earlier. It became popular in the United States around the turn of the century.

Golf is a very old game. Apparently, it (Kolf, as it was spelled) was played by the shepherds of the Low Countries (Holland, Belgium) as early as 1500. The shepherds used their crooks for clubs, and a leather ball stuffed with feathers. The links were laid out along the coast. The game was introduced into Great Britain at the time of James II, but it took hold better in Scotland. The members of the St. Andrews Golf Course compiled the rules under which golf is played today.

Golf lends itself to many hybrid games whereas croquet apparently does not. Among the combinations are clock golf, bingo golf; goofy, sidewalk and shinny golf; marble, hockey and basketball golf; hopscotch, archery and croquet golf, to name a few. Croquet golf is played with both croquet balls and

mallets and on an ordinary lawn.

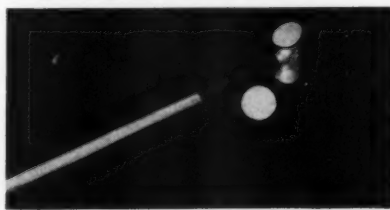
Crolf, the game described herein, was originated at Little Point Sable, ten miles west of Shelby, Michigan which is about midway between Muskegon and Ludington, on Route U. S. 31. The game got its start about 1915. The Association of Lot Owners at Little Point Sable, comprised of vacationers with their families, had considered laying out a golf course but found the terrain unsuitable and too expensive. The children had amused themselves by driving a ball with a croquet mallet around a course of three or four holes, tin cans sunk into the ground. Drs. Sam and John Wilson, both dentists, observed the interest in the game and laid out a nine hole course which was later extended to eighteen holes. The course at Little Point Sable is the only known one in the world and consists of about 14 acres of marginal land which at one time was used for raising hay and grain; but due to the poor, sandy soil, farming on it was not practical. The distance between holes and tees vary; the longest, a dog-leg, is 142 yards, par 4, and the shortest is 32 yards, par 2. The total distance is 1283 yards which is approximately $\frac{3}{4}$ mile. A player will walk about a mile in playing the game unless he slices the ball and has a bad time of it, in which case he may walk a mile and a half. An average drive is approximately 75 yards including the roll of the ball. The equipment is manufactured by the Association itself and carries a trade mark. Originally, the balls of latex were made in special molds and vulcanized in an oven of a cooking stove at the Point. Now they are manufactured by a contractor for the Association. The rubber crolf ball is larger than a golf ball but smaller than a baseball, being

Mr. Carter gave this talk at a luncheon meeting of the Western Society's new Speaker and Paper Division. This group meets at 12:15 p.m. most Thursdays at Society Headquarters.

about 2 inches in diameter and weighing 4.4 ounces.

The wooden croquet mallet is no longer used. The modern crolf club has a head of specially designed cast metal which is fastened securely to either iron or wood shafts such as used for golf clubs. One face of the head is flat and the other face is cut at an angle of 45 degrees for lofting the ball out of an obstinate depression or trap. The metal head weighs approximately 13 ounces and is about 5 inches long.

Crolf is not intended to replace golf but it does provide a substitute. In these days when private golf courses are becoming an expensive luxury because of high taxes and economic rent, an open field of 15 to 20 acres will provide the crolf fairways. All the equipment a player needs is one club, one ball, a score card and pencil. Both young and old at Little Point Sable enjoy playing crolf and the tournaments are spirited contests among the various age groups of men, women, boys, and girls who compete for trophies.



Crolf club and ball

High Energy Rocket Propellant Fuel

Hydrogen-oxygen for use as rocket fuel has moved from the research stage to that of development, a jet and rocket combustion symposium of the American Institute of Chemical Engineers was told in San Francisco on Dec. 7. Fluorine also was said "to have distinct advantage" as a high energy propellant.

Such was the conclusion of a paper, "Problems of High Energy Propellants for Rockets," by Walter T. Olson, of the National Aeronautics & Space Administration, Cleveland, O.

"For even bigger missions, these advantages over conventional propellants would analyze to be even larger," he said "... it is evident that the unique problems associated with hydrogen or fluorine are well defined that there are directions to follow to solve these problems and that hydrogen-oxygen, at least, has moved from research to development."

He pointed out that the object of a rocket engine is to put enough energy or speed into a payload "so that it coasts where we want it to go." To circumnavigate the moon and return, a rocket would have to attain a speed of 23,000 miles an hour to leave the earth's pull of gravity and 7,000 miles per hour to leave the moon's pull to return to earth.

Among the problems to be solved before hydrogen-oxygen or fluorine can be used as a propellant, he said, is that of igniting the fuel, which he called "an extremely sensitive problem." In a 20,000 pound thrust engine, for instance, "sufficient propellants at full flow can accumulate in a few tenths of a milli-

second to exceed the bursting strength of the chamber . . . fluorine has been found to be spontaneously flammable with the fuels that will be used with it, hydrogen, jet fuels and ammonia or hydrazine. Oxygen is a different story. The problem with oxygen is to achieve

immediate ignition and to spread the flame rapidly across the propellants as they enter."

Pumps, turbines, tanks and fluid systems, combustion, cooling and nozzles also pose particular problems in the use of the two fuels as propellants, he said.

Guide for Recruiting Graduates

A universally applicable guide for the recruiting of engineering college graduates has just been published by the American Society for Engineering Education.

Activities bringing together college graduates and would-be employers must meet four conditions, ASEE says:

1. To promote a wise and responsible choice of career.

2. To strengthen students' sense of integrity.

3. To develop in students an attitude of personal responsibility for their choice of career and for their success in it.

4. To minimize interference with education.

"It is in the best interest of students, colleges, and employers alike that the selection of careers be made in an objective atmosphere and complete understanding of all of the facts," according to the ASEE guide. The eight-page leaflet lists in detail recommended practices and procedures by employers, colleges, and students to assure that these ends will be achieved.

"It is the hope of ASEE," according to Professor W. Leighton Collins of the University of Illinois and secretary of the Society, "that this leaflet gets into the hands of every engineering senior seeking employment, as well as recruiter, and college placement officers."

"It is designed as an aid in the development and maintenance of high ethical standards in the procedures of college recruiting and in the relations between the employing organization, college authorities, and college students."

This is the second revision of the original "code," first published in 1949; the current revision is entitled "Recruiting Practices and Procedures—1959."

W. W. Burton, employment manager

of the Minnesota Mining and Manufacturing Company and chairman of the ASEE Committee on Ethics which was responsible for the publication, says, "This is a combination of the best thinking of representatives from both industry and education and represents the highest standards of ethical procedures yet developed. In its preparation industry and education have had equal voices."

The Ethics Committee of the Engineers' Council for Professional Development, the organization responsible for accrediting engineering curricula, again has endorsed the "code." Indeed, according to P. L. Alger, chairman of ECPD's Ethics Committee, this ASEE recruiting "code" now constitutes a supplement to the ECPD Canons of Ethics.

Six-Day Week

An appliance company in a labor-short West Germany holds Saturday lotteries to keep its workers on a six-day week, reports *International Management Digest*. The firm offers a lottery of 20 prizes—including its own refrigerators and washers—plus free beer and sandwiches in addition to overtime pay, to employees who report for work on Saturdays.

Tree Crusher

A huge new tree-crushing machine can clear scrub forest land at the rate of three acres an hour, declares *Construction Methods and Equipment*. The 47½-ton, diesel-electric machine pushes trees to the ground and smashes them into splinters with heavy, blade-studded rollers. The vegetation becomes a compressed mat that can be burned in place.

In Memoriam

The Western Society of Engineers has recently been notified of the following deaths of members:

P. W. King ('19, LM), Sept. 18, 1959

Joseph Philippi ('58, M), Nov. 25, 1959

K. A. Auty ('20, LM), Nov. 30, 1959

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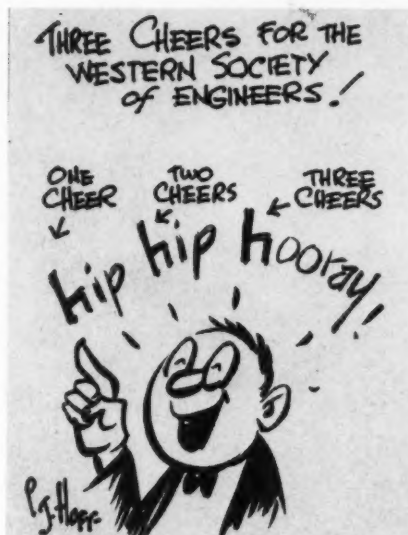
Noon Luncheon News

Series I Ends

Series II Begins



On December 2, WBBM-TV's popular weathercaster, P. J. Hoff, proposed, "Let's Do Something About the Weather." Above, we see him doing something, talking and drawing his friend, Mr. Yell 'n' Cuss.



Above, P. J. wishes the Western Society of Engineers "Good Luck." As may be imagined, the talk had a humorous bent, and was illustrated by the inimitable cartoons from the brush of P. J. Hoff.



The discussion on December 9 was entitled "Recent Definition of the Contribution of Traffic Engineers and City Planners to Metropolitan America." Albert Forde, left, president of Western Division of the Institute of Traffic Engineers presented the traffic engineer's view. Roger L. Creighton, president of the Western Great Lakes Chapter of the American Institute of Planners, gave the planner's view.

Clifford C. Gregg, director of the Chicago Natural History Museum, spoke on December 16 on "The Inside Story of the Museum." Herbert C. Hoff, right, almost missed by the photographer, was actually much in evidence by his sprightly introduction of Mr. Gregg.





From fronting pylons to floating floors...

dramatic Santa Monica Auditorium is a showplace of modern concrete!

Graceful beauty goes hand in hand with practicality in the new concrete Civic Auditorium at Santa Monica, California.

72-foot concrete pylons are combined with an ornamental grille rising from mezzanine floor to roof. The concrete grillwork was pre-cast at the site. And this dramatic facade will keep its beauty.

Inside, the concrete floor is flat for sports events—and tilts to "full auditorium" position with 2,750 seating for stage shows and concerts. The sidewalls and loft structure of

the building are cast-in-place concrete. So is the upper level concourse, while the grand stairways leading to it are of precast concrete.

The auditorium is an impressive example of both excellent design and imaginative uses of concrete in new and exciting forms. And because it's *concrete*, upkeep will be outstandingly low... and fire-resistance uniformly high.

Architects & Engineers: Welton Becket, F.A.I.A., and Associates, Los Angeles. General Contractor: C. L. Peck and Millie and Severson, Inc., Los Angeles.

PORTLAND CEMENT ASSOCIATION

111 West Washington Street, Chicago 2, Ill.

A national organization to improve and extend the uses of concrete

**FOR STRUCTURES...
MODERN**

concrete

